February 8, 1930 *A McGraw-Hill Publication* 25 Cents per Copy

AVIATION

The Oldest American Aeronautical Magazine

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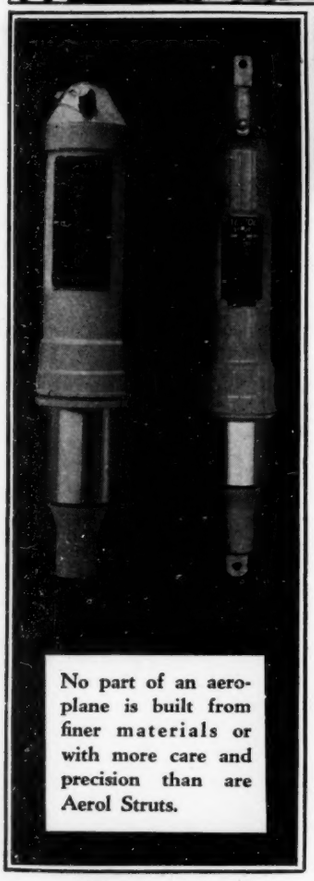
THE *Curtiss "Tanager"*

THE STORY OF THE *Safety Competition*

Sales Policies AND THE PRIVATE BUYER

Changing Emergency Landings from Crises to Incidents . . .



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AVIATION

The Oldest American Aeronautical Magazine

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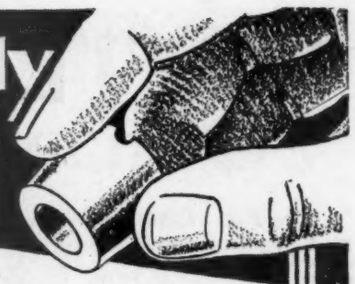

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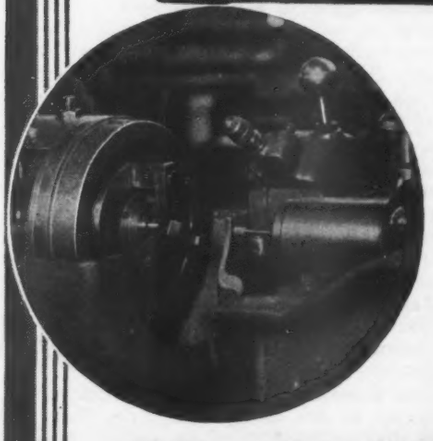

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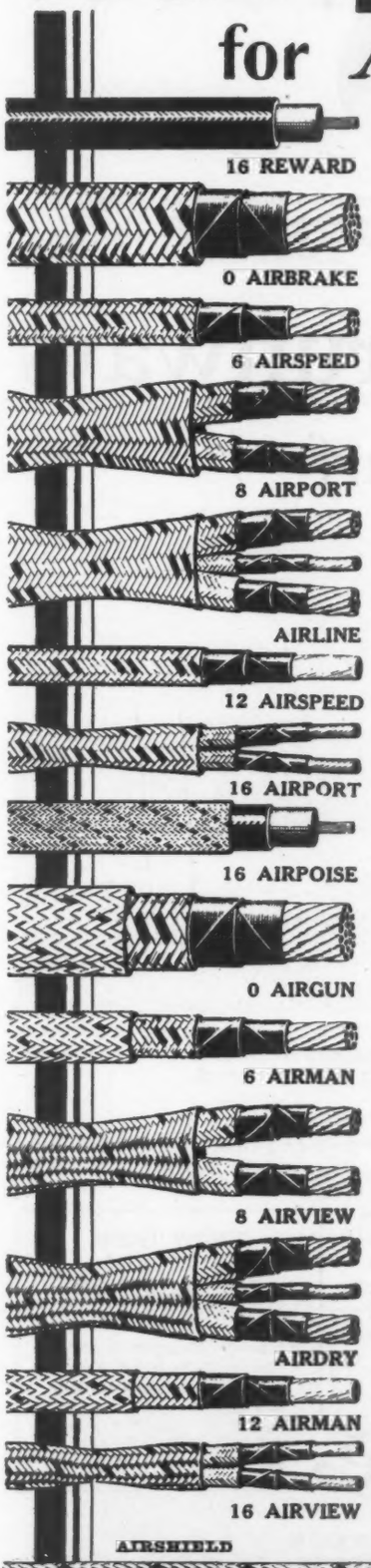

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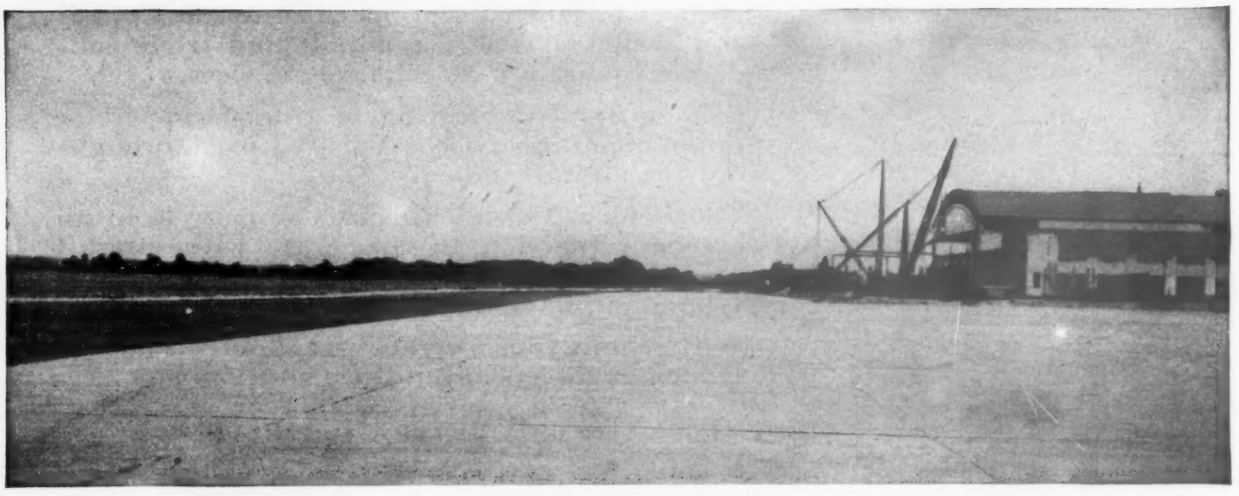

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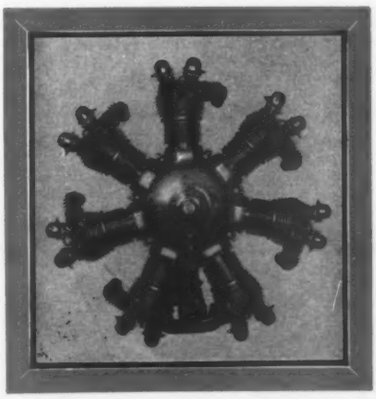

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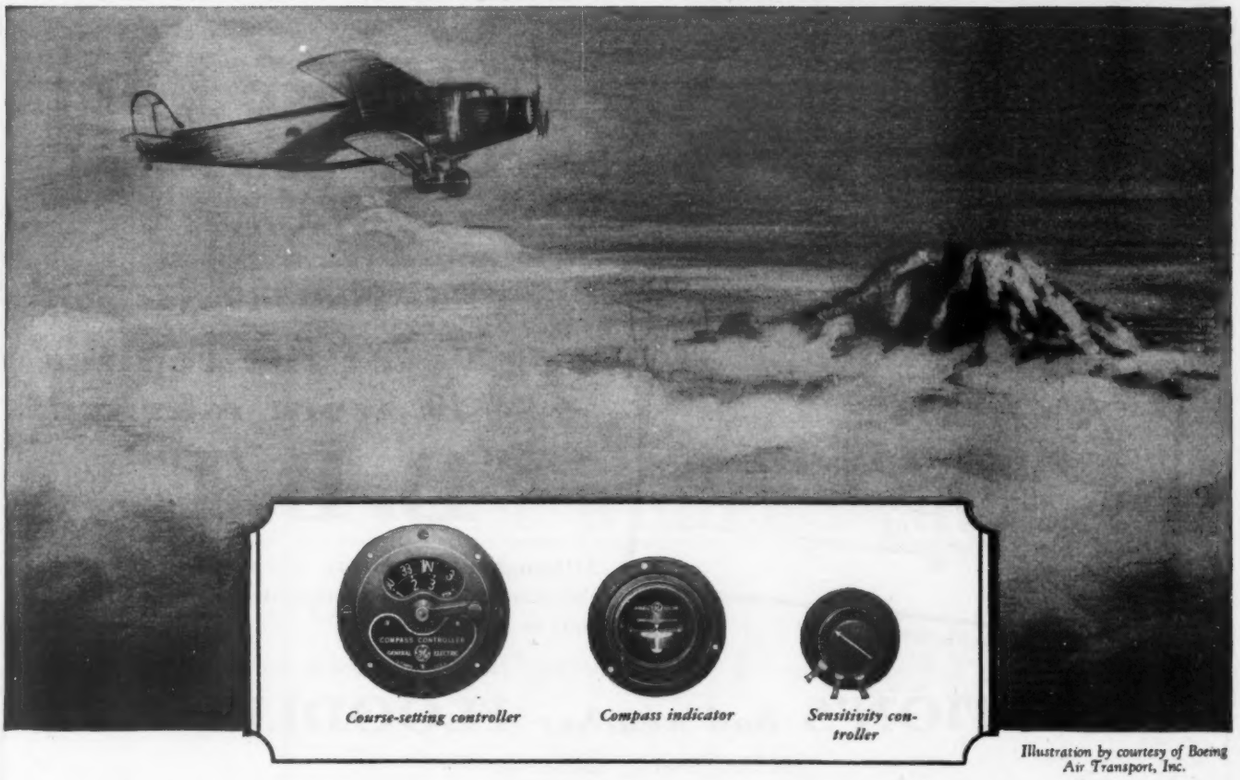

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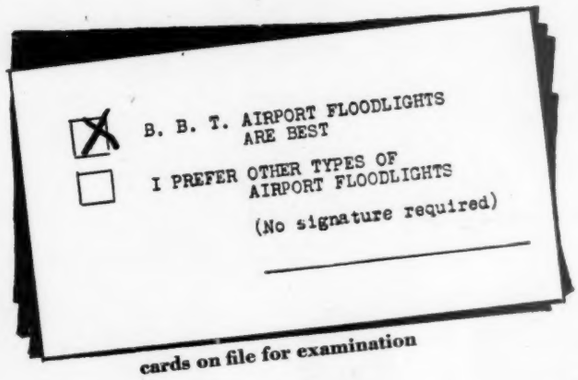

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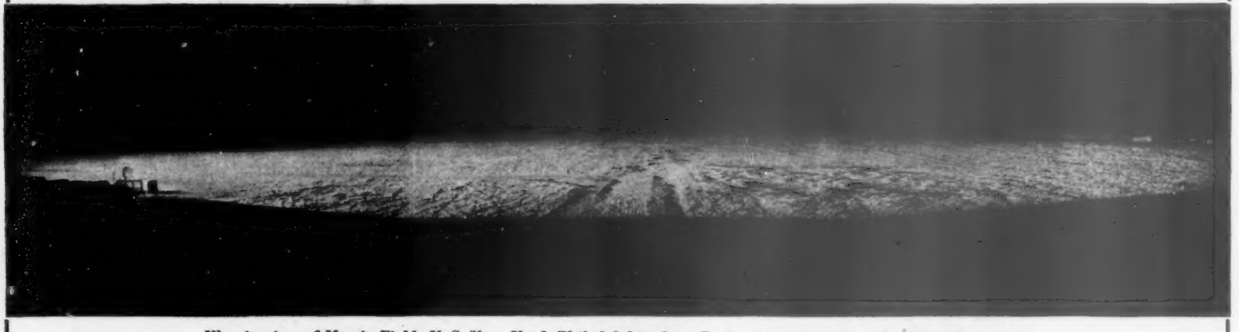

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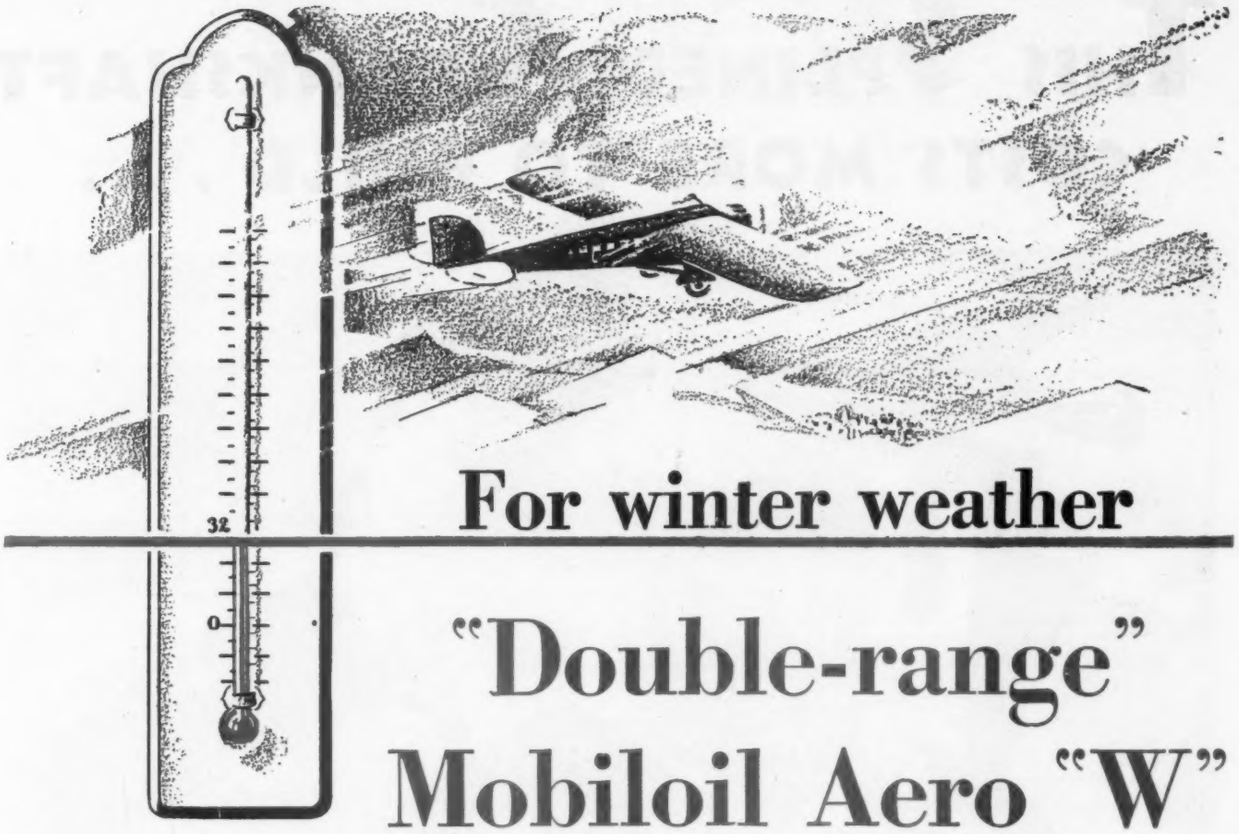

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AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A McGRAW-HILL PUBLICATION . . . ESTABLISHED 1916

EDWARD P. WARNER, *Editor*

VOLUME 28 . . . ***February 8, 1930*** . . . NUMBER 6

Three Thousand Miles from the Facts

FOR a number of years we have been reading with continuous delight the writings of our confrere C. G. Grey, editor, publisher, and general main-spring of *The Aeroplane* of London. Mr. Grey is always entertaining, always ingenious, always stimulating,—but unfortunately he is not always accurate. Writing up the Guggenheim Safe Aircraft Competition in detail in a recent issue of his journal, he has, it would seem, been rather badly misled by second-hand information.

An erroneous account of such a competition might be unimportant if it came from a less talented and conspicuous pen, or if no international element were involved. Under the actual circumstances it assumes considerable importance and demands some detailed analysis, for the impression left in the minds of readers knowing nothing of the facts would unfailingly be that the officials of the competition were both unsportsmanlike and incompetent, and that they set out with the deliberate determination of bringing an American plane home the winner at all cost.

Where there is so much that it is inaccurate or misleading it is necessary to proceed to correct the impression left upon the minds of our readers, both at home and abroad, by selecting a few typical examples. An exhaustive discussion of every point would use up our entire editorial space and something more besides.

Thus Mr. Grey states that "the day before the last day fixed on which competing machines could arrive at the field without being disqualified, the Handley Page was the only machine on the spot. All the other European entries had been cancelled and none of the American entries had arrived." Whereupon the editor goes on to explain that the officials waived the rule requiring arrival by a specified date (October 31).

What are the facts? They were given in AVIATION for November 16. One of the American competitors had been submitted for trial in June. Another came along in September. Then (we quote from our own article of November 16) "With about four days to go, things began to happen. The Curtiss was flown to Mitchel Field and officially turned over. The Command-Aire arrived by air, as did the Fleet. The Schroeder-Wentworth, which had never yet been in the air, came in by express from the plant at Hammondsport, where it had been built." The only basis for the suggestion that the rules were waived is that, since bad weather had interfered with flying for several days before the closing date, the officials of the Fund decided that any machine which had been ready to start by air by October 31, and which had been prevented from doing so only by the weather, should be allowed to report when and as soon as the weather permitted. Two planes arrived after October 31. Neither of them figured in the slightest degree in the final reckoning.

Let us have another example. Mr. Grey further declares that in order to prevent the competition breaking down entirely, when it was found that only the Handley Page could pass the stability test, "the Committee altered the rule to read that after diving the machine must right itself without the controls being handled,—*except those operating the safety devices.*" To that, we can only oppose a flat contradiction. There was no such alteration of rule. There was no alteration of any rule affecting the stability tests. Only one possible explanation occurs to use for the extraordinary statement quoted. It may refer to the fact that machines with manually controllable flaps were allowed to do their free-control stability test with the flaps up. The flaps had to be somewhere, and

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that seemed the most logical position. To have required that there be complete free-control stability with every possible flap setting would be almost as absurd as to demand that a machine should trim at the same speed, or at least at a speed within the normal flight range, for all settings of the adjustable stabilizer.

There follow various inaccurate statements or misleading implications, which we will not attempt to report in detail, about the relative performances of the two leading machines, and a goodly number of suggestions of possible or probable error in the methods of testing employed. The statements made about the test methods and the condition of the instruments used, in fact, would carry the depressing conviction that the competition was conducted by morons.

We can claim some degree of familiarity with flight testing methods, including British and Continental as well as American practice. It has been our privilege to discuss the subject with admitted experts in several countries, and to share in some of their work. We can say without reserve that we have never seen tests more carefully made or productive of more consistent results than the final series (the only ones that were counted upon the two machines undergoing the complete series of tests) at Mitchel Field this past fall. Instrument troubles developed. They usually do in any long series of experiments under difficult conditions. They were rectified as discovered. Results were checked and cross-checked. Technique was steadily improved, and in the final series of observations the results obtained were, we believe, substantially beyond reproach.

It should not be necessary to enlarge upon such points, or to appear to defend the competition and its officials. We feel inclined to apologize for having done so, but we cannot allow attack or inuendo to pass unchallenged, especially when it may carry a most misleading impression to fair-minded men beyond the seas. We have written with no desire to uphold the Curtiss Company or to condemn its principal competitor, which had excellent qualities and was based upon pioneer research work that we regard with profound admiration. We have only one interest: that the facts shall be accurately stated and accurately interpreted about a competition of enormous significance which was freely thrown open to the entire world.

//

On Doing the Pilot's Thinking for Him

READING the new regulations just promulgated by Assistant Secretary of Commerce Young, requiring all transport planes to remain at a height of at least five hundred feet at all times, we find ourselves in a somewhat peculiar position. We have pleaded the cause of safe flying and of safety study in season and out, and we flatter ourselves that no one has been more persistently devoted to that topic. We have been almost uniformly in sympathy with the courses taken by the Department of Commerce's Aeronautic Branch, and have been almost unvarying in praise of their policy. Yet now, when we find ourselves in disagreement with them, it is upon the wisdom of an edict specifically and solely designed to increase the safety of operation of transport lines.

We do not, to be sure, dissent from the soundness of the piloting practice which the new rule demands. While there are circumstances under which it is safe to fly a large transport plane at less than five hundred feet, they are exceptional. Lower elevations are never to be recommended,—but to disapprove the practice that the rule forbids is one thing, and to approve the rule forbidding it is quite another. Never yet has anyone discovered means of making men careful, or of making them exercise foresight, by fiat. There is no substitute for commonsense and discretion, and they have to be generated from within. They cannot be imposed from without.

If such a practice as that just ruled by the Department of Commerce is a proper one, and we believe that it is, then it ought to be followed by every competent pilot of his own accord. If he needs some higher authority to tell him how to fly he should not be allowed to fly with passengers at all, for he is sure to find some way of getting himself into trouble, however many detailed injunctions may be laid upon him.

It is not only that such a rule should be unnecessary with proper personnel, or that the very fact of its imposition indicates a serious doubt of the piloting personnel's qualifications. It may even prove positively dangerous. A pilot who needs guidance of that sort to tell him at what height he should fly with passengers under bad weather conditions may quite as easily go further, and take it for granted that he has done everything necessary when he has followed out the letter of his instructions. To order the pilot to remain at a height of five hundred feet is not by any means to assure him that five hundred feet is always a safe altitude,—yet the danger is that a man whose own judgment is so questionable as to need that sort of instruction will take it so, as providing not only a necessary but a sufficient course.

The primary function of the Department of Commerce is to determine the qualifications of the personnel and of the organization, to make sure that it is competent to operate safely and that it is equipped to do so. We warmly applaud the intimation that the Department is henceforth to license air lines, as to the route followed and the ground organization and the special instrumental or communication equipment, as well as the bare airplanes and the operating personnel. Accidents result not from deliberate seeking after danger, but from insufficient competence somewhere along the line. Once that is assured, the making of a good safety record should

follow automatically. Get men who know how to operate, and it will not be necessary to tell him how. Get men who do not know, and enough instruction to fill an encyclopedia will not keep them out of trouble.

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Better Fuel and Less of It

IN THE REPORTS of Congressional hearings, there are a great many things besides tabulations of money already expended. They are a mine of unexpected and entertaining information. So, in presenting the estimates for fuel for airplanes for the coming fiscal year to the Committee on Appropriations of the House of Representatives, the Chief of the Air Corps explained that a marked change of policy was in progress—that unit costs for fuel would be higher in future because of a more extended use of special high-grade gasoline and gasoline doped with tetra ethyl lead.

We count that one of the best pieces of news that the dawning new year could bring. Too long has the American aircraft operator had to wear "domestic aviation gasoline," the standard fuel on sale at every airport, as a millstone around his neck. Too long have engines been designed with reduced compression ratios and intake manifold pressures, built with increased weight of material and parasite resistance and fuel consumption, in slavish devotion to the principle that they must demand no nutriment more delicate than the "D.A.G." of the Federal Fuel Specifications Board. Even with the coming of ethyl, making it possible to rectify the detonant qualities of a low-grade gasoline by adding to it a little vial of another fluid, prejudice against "trick fuels" and "trick engines to take advantage of them" has died hard.

For years American aircraft engines have been built to operate upon a fuel of which the best that can be said is that it was an appreciable improvement over what was commonly poured into the tank of a Model T. Our friends abroad have laid no such handicap upon themselves. We have greatly admired the performance of the British engines that have won the last two Schneider races. They deserve admiration, but it is well to remember that they did not make their records upon ordinary run-of-the-mine aviation gasoline. Far from it. They were not even the direct descendants of commercial power plants designed to run upon that fuel. European factories have for years been building engines for use with a benzol or ethyl blend, and with nothing else—nor do we see any good reason why they should have been restrained from doing so. It was upon our own side that the error lay.

We are well aware that this will be acclaimed as heresy by some of the most distinguished of power plant authorities. We shall have to chance that. It is our story, and we stick to it. We are even prepared to defend it at length.

Half a dozen years ago it could fairly be argued that special fuels were so hard to secure that every airplane must be prepared to use automobile or motorboat gasoline in an emergency. With approximately a thousand airports in full swing in the United States that plea has lost its force except in very special cases. Refiners of gasoline are prepared to produce better fuels, and airport managements will stock them, as soon as a demand becomes apparent. At least the transport companies, doing all their flying at fields where they control their own fuel supplies, can shed the incubus—and increase their engine power and cut their needed tankage simultaneously by raising compression ratios and supercharging. Already, it is gratifying to note, certain oil companies have pioneered the way by adopting their own specifications for a product of much higher grade than the present standard. It is possible to prepare, by methods known at the present time and from crude oils now available, a fuel that will actually be worth to the commercial operator at least eight cents a gallon more than what he is getting now. It will save him that much money, but as a matter of fact the extra cost need not be as much as that.

The Army's action is important not only as showing the growing strength of the improved-fuel cause (the Services might have taken such action much more promptly than they have, were it not for difficulty over the composition of water-tight specifications for anti-knock quality), but also for the pressure that it brings to bear upon engine builders, refiners, and especially upon the managements of the fields that Army planes are likely to visit. With the Army and Navy agreed in demanding what used to be called "fighting grade" gasoline as the standard supply for a large proportion of their aircraft engines, the small commercial operator or the individual wanderer by air should be prompt to reap the benefits in better engines and lower consumption—if he is awake to his own interests.

THE Circulation Department desires to make the announcement that the classified and alphabetical index for Volume 27 of AVIATION *is now ready for distribution to all those who desire same. This index covers the issues of* AVIATION *from July to December (1929) inclusive.*

All requests for the index should be addressed to . . . . Circulation Department, McGraw-Hill Publishing Company, Inc., Tenth Avenue at 36th Street, New York, N. Y.

THE GUGGENHEIM *Safety Competition Tests* AND

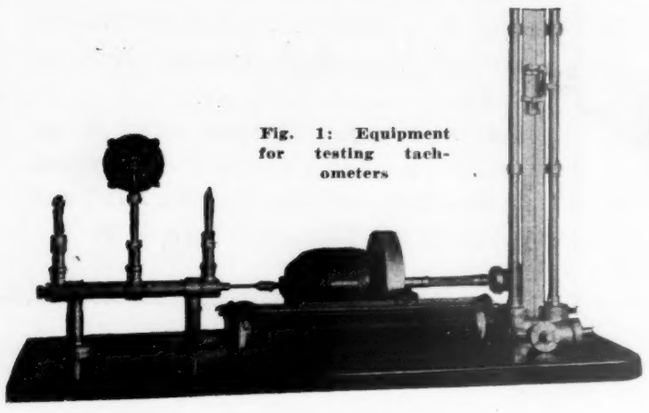


Fig. 1: Equipment for testing tachometers

By WILLIAM G. BROWN

Professor of Aeronautical Engineering, M.I.T.
(on leave of absence; Technical Aide to the Guggenheim Fund)

THE Daniel Guggenheim Safe Aircraft Competition, which culminated in the award of the first prize of $100,000 to the Curtiss Aeroplane & Motor Company, was announced on April 20, 1927, for the avowed purpose of achieving "a real advance in the aerodynamic characteristics of heavier-than-air craft without sacrificing the good practical qualities of present day aircraft." Rules for the competition stipulated that the competing airplanes must pass certain qualifying requirements, after which they might compete for five safety prizes of $10,000 each, and for one first prize of $100,000. The safety prizes were to be awarded to the first five airplanes passing the prescribed safety tests and demonstrations, and the first prize (less the safety prize, if already received) to the airplane making the highest number of points in seven of the safety competition tests.

Although the Competition was opened on September 1st, 1927, no entries were received at Mitchel Field, where the tests were conducted, until September, 1929. This was less than two months prior to the closing date. Of the twenty-seven competitors who signified their intention of entering the competition, only fifteen actually presented airplanes for test. Of the number presented, three were withdrawn, two were damaged in preliminary test flights, and eight failed to pass the preliminary requirements. Of the two airplanes which were serious competitors for the safety prizes, only one, the Curtiss "Tanager," was able to pass all tests satisfactorily.

THE TESTS conducted by the Guggenheim Safety Competition focused attention for the first time on the measurement of safety performance of aircraft. As outlined by the Fund, the proof of safety in aircraft involves flight at comparatively low speed. This is a phase of aircraft performance never before carefully considered in standardized performance tests, which are largely the outgrowth of the military acceptance tests of the war period. As demonstrated by advertised performance in landing speed and take-off distance for

Professor Brown (left) and Lieutenant Stanley Umstead (right) before the "Tanager"

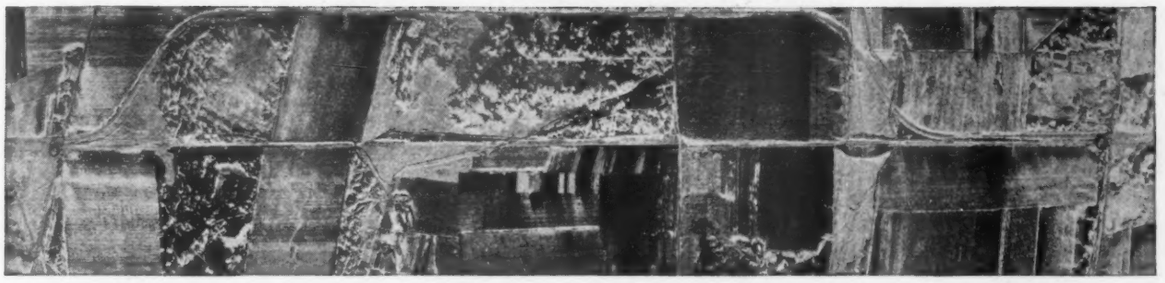


Fig. 2: The speed course along the Long Island Railroad near Mitchell Field where the tests were made

THE *Curtiss "Tanager"*

commercial aircraft, tests of this sort involve difficulties and inaccuracies not encountered in the measurement of other performance characteristics. This is not only because of the fact that at low speed measuring instruments are inaccurate, but also because of the relatively large effect of uncontrollable conditions of test environment, such as wind, ground smoothness, etc. Fortunately, all competition tests in which these uncontrollable factors played an important part were made in the autumn months when air density conditions were nearly standard. However, at times it was necessary to wait for days in order to get normal air density at the ground, a low wind velocity, and a dry and firm landing surface. Even under what seemed to have been ideal conditions, differences in the results of duplicate tests occurred, and it was necessary to run many checks, and sometimes comparative tests on competitive airplanes simultaneously, in order to get truly representative results. One fact, brought out clearly, was that with the unusually skilled test pilots available to the Fund any discrepancies in test data were not the result of piloting. Wherever duplicate tests were carried out under similar conditions, but with different pilots and observers, the results checked invariably within the precision limits of the test. This showed that the personal equation had been reduced to a minimum.

In the actual measurement of the various performance characteristics every reasonable precaution was taken to insure accuracy. The instruments used were the best obtainable. All these instruments were calibrated by a competent agency. For certain instruments, such as tachometers, air-speed gauges, and barographs, special calibrating equipment was installed at the competition hangar (Figures 1 and 3), verified by a representative of the Bureau of Standards, and used for checking the various instruments after each test flight, or whenever there was any doubt as to their reliability.

As soon as received by the Fund, each airplane was carefully inspected by the test personnel, and by at least one technical adviser, in order to determine to what extent the basic qualifying requirements had been met, and in order to insure reasonable safety to personnel during the flying tests. The weight of the useful load to be carried was then computed (5 pounds of useful load for each unit of rated horsepower), and the weight of each item recorded as it was placed in the airplane. The useful load was finally brought up to the required total by the addition of lead in the cabin cockpits. In the case of the Curtiss "Tanager," the required useful load was

The Guggenheim Safety Competition involved very difficult and in some cases novel problems of testing methods. In their solution by the technical advisors and observers Professor Brown as chief observer had a leading part. In the article here presented Professor Brown, formerly of the Langley Field staff for the National Advisory Committee for Aeronautics, has explained in detail both the methods of testing and the way in which the "Tanager" reacted to them.

The Results of the Tests on the "Tanager"

	Test Results	Limits Required	Credit Points
Maximum speed (m.p.h.)	111.6	110	0.0
Min. horizontal speed (m.p.h.)	30.6	35	8.8
Min. gliding speed (m.p.h.)	37.1	38	3.6
Rate of climb at 1,000 ft. altitude (ft./min.)	700	400	None
Landing run (ft.)	90	100	6.7
Landing distance over 35-ft. obstruction	293	300	3.5
Take-off run	295	300	0.3
Take-off distance over 35-ft. obstacle	500	500	0.0
Flattest glide (degrees)	6	8	None
Steepest glide (degrees)	13.2	12	None
			22.9

Additional Data

Weight empty (lbs.)	1,979	Rated horsepower (at 1,830 r.p.m.)	176
Uefuls load (lbs.)	880	Wing loading (lb. sq.ft.)	8.6

880 pounds, of which less than 100 pounds was lead. In order that the weight and center of gravity position of the airplane would not be changed seriously by the consumption of fuel, all flight tests were limited to one hour duration.

HIGH SPEED in level flight at the ground was determined by timing the passage of the airplane over a measured speed course and averaging the ground speeds in two directions. At least three flights in each direction were made over the course at a time when the standard altitude corresponding to the existing density at the ground was within a thousand feet of sea level. The flights were made at an absolute altitude of 20 to 30 ft. only on days when the wind was blowing along the course at a velocity of less than 10 m.p.h. Fig. 2 shows a mosaic of the speed course, laid out over level country beside a high tension line of the Long Island Lighting Co. The presence of the high tension wires gave an indication of the proper height of flight and insured against deviations from a straight course. The course was surveyed and its length of 11,722 ft. certified by a licensed civil engineer. Timing over the course was done by the observer in the airplane, who also noted the r.p.m. of the engine in order to determine that the power of the engine was in agreement with its rated horsepower. The high speed of the "Tanager" was found to be 111.6. Only two other airplanes were able to pass this first preliminary flight test requirement.

The second preliminary test carried out was the measurement of rate of climb at the ground. This was measured in the usual way, using a Freize barograph to record changes of pressure which were later converted to changes of altitude by the use of the tables in N.A.C.A. Reports Nos. 216 and 218. The indicated rate of climb so determined was then corrected by multiplying it by the ratio of the observed mean absolute temperature to the mean absolute temperature for the same pressure altitude interval as given in the tables. Air temperatures were obtained by a strut thermometer which had been calibrated previously against a standard thermometer in the meteorological office at Mitchel Field. During this test it was discovered that airplanes such as the Tanager climb fastest at an airspeed considerably greater than that given by the well-known approximate formula

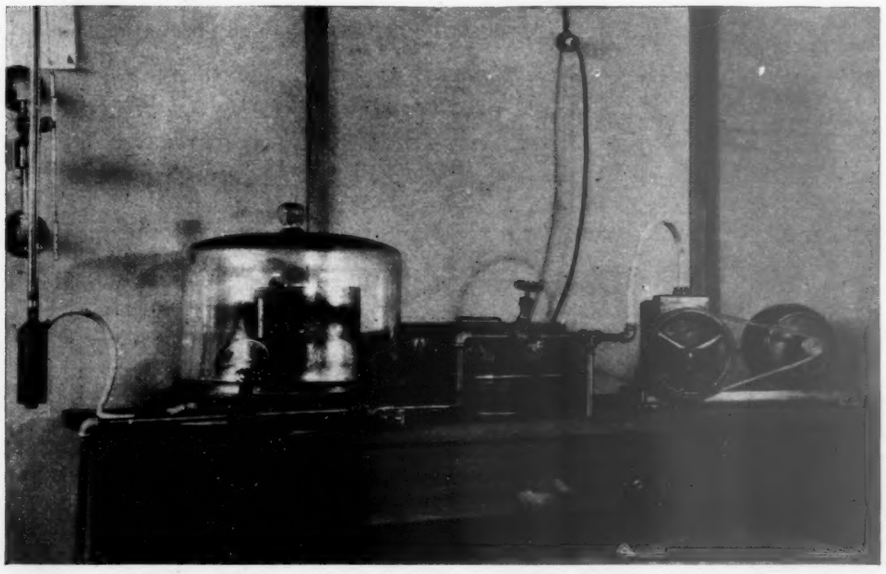
$$V_c = \frac{V_s + V_m - V_s}{3}$$

where

V_c = Indicated speed of maximum rate of climb
V_s = Minimum flying speed
V_m = Indicated maximum level speed.

The best initial rate of climb of the Tanager occurred at an indicated airspeed of 80 m.p.h.; whereas the indicated speed of best rate of climb, as given by the approximate formula, is 57 m.p.h. The reason for this apparent discrepancy lies in the fact that the airplane with its slots closed and flaps up for the best rate of climb would have had a minimum flight speed considerably in excess of the minimum speed determined with the slots and flaps in action. At sea level the Tanager was found to have a rate of climb of 700 ft. per min., so that it passed with a good margin this requirement of the competition, as did all other entries tested.

ONE OF the tests which required the greatest amount of care and attention to detail was the measurement of minimum speed in glide and in level flight. This was especially true, since for this test points could be counted toward the final score and since two of the competing ships had performances in gliding flight very close to 38 m.p.h., the requirements specified in the rules. In the case of the Tanager an error of measurement of one quarter of a mile per hour in minimum level flight speed would have affected its final score by 5 per cent.



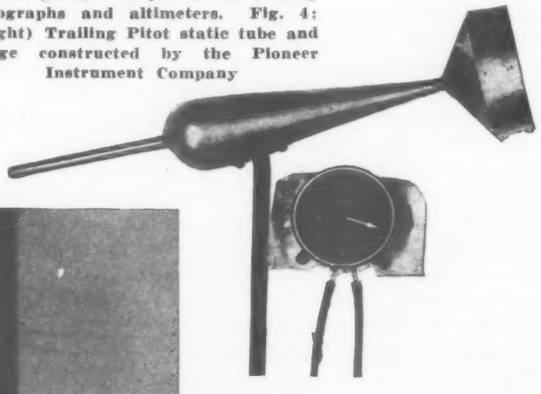


Fig 3: (Left) Bell jar for calibrating barographs and altimeters. Fig. 4: (Right) Trailing Pitot static tube and gauge constructed by the Pioneer Instrument Company

Among the considerations which determined the choice of method used in measuring minimum speed were:

1. The Tanager when flying level at minimum speed tended to oscillate slightly if disturbed by an air bump. If this occurred, the airspeed increased several miles per hour before the plane could be brought back to its proper attitude. Since the rules of the Competition implied that the minimum speed credited to the airplane must be maintained for a considerable time, it was necessary to have particularly smooth air conditions before

the plane could be fairly tested.

2. Timing the airplane over a ground course would involve relatively large errors, if changes in wind velocity occurred, and could not carry out at sufficiently high altitude to insure smooth air conditions.

Fig. 5: N.A.C.A. micro manometer used in calibrating air speed meter gauges

IT WAS finally decided to utilize the method developed by the National Advisory Committee for Aeronautics, in which a suspended Pitot-static tube (Fig. 4) is trailed below the interference region of the airplane. The particular Pitot-static head used, shown in one of the illustrations, was manufactured by the Pioneer Instrument Company. Its calibration, carried out by the Bureau of Standards, showed that the pressure difference produced was below the theoretical, due to the length and construction of the Pitot tube. This made it necessary to correct all values of indicated airspeed by multiplying them by 1.025. The gauge used in the cockpit was a special Pioneer instrument with the dial graduated in units of one mile per hour. Immediately after each test this gauge was removed from the airplane and the true pressure difference corresponding to its indication determined by a N.A.C.A. micromanometer (Fig. 5). The pressure difference so obtained was converted to airspeed through the use of the table of "Pressure of Air on Coming to Rest from Various Speeds," contained in N.A.C.A. Report No. 247. The only correction to this indicated speed was through the use of the factor 1.025, since, regardless of the altitude at which the tests were made, the Pitot-static tube gave the speed performance at sea level. In order to insure accurate results, the trailing Pitot-static head was inspected and the tubing installation checked for leaks before all flights. Also, the temperature of the calibrating room was maintained at 22° Centigrade, for which the constants of the micromanometer and all other calibrating equipment were known. The actual piloting was simplified by the installation of the airspeed meter gauge and a sensitive Kollsman altimeter at a point on the instrument board which was visible to both the pilot and the observer.

As a second method of measuring minimum speed of flight the Fund procured two air logs, shown in Fig. 6, which were designed and built by the British firm of Barr & Stroud, Ltd. These air logs were so designed that when suspended beneath the airplane the revolutions per minute were recorded in the cockpit. By the application of the proper conversion factor the true speed of the airplane through the air could thus be determined. In several tests in which minimum speed was determined by the use of both the suspended Pitot-static tube and the air log, checks within 0.2 m.p.h. were obtained. However, since a density correction had to be applied to the minimum speed readings obtained from the air log, in order to convert them to minimum speed at sea level, and since the air log was found by the Bureau of Standards to have a large temperature instrumental error, this instrument was not considered as satisfactory as the trailing Pitot-static tube.

THE MINIMUM horizontal flying speed of the Tanager was found to be 30.6 m.p.h., which was 4.4 m.p.h. under the required minimum, and 2.8 m.p.h. lower than that of any other plane tested. In the case of the Tanager this minimum horizontal speed was obtained with the throttle wide open, although for at least one of the other airplanes in the Competition, the minimum speed was obtained with the engine throttled somewhat. Minimum speed in glide was obtained with the engine throttled to 500 r.p.m. For the Tanager, the only plane to meet the requirement of 38 m.p.h., the value was 371.

In the measurement of landing run a number of observers were placed on a line parallel to the direction of landing. The point at which the airplane first touched the ground was sharply defined by marks made by the landing gear. The distance from this point to the point at which the airplane finally came to rest was measured by tape. At the instant when the airplane touched the ground a determination of wind velocity was made by a Short & Mason anemometer located as near as practical to the landing line. The landing run corresponding to the no-wind condition was obtained by plotting length of landing run against wind velocity and by drawing a straight line through the mean of the representative points and through the 38 m.p.h. point on the wind-speed axis, at which wind speed the airplane was assumed to have zero run. The intersection of this line with the zero wind-speed axis was taken as the landing run. Any attempt to take account of variations in ground friction was found to be impractical, and to avoid discrepancies due to this cause, tests on competing airplanes were carried out on the same day, with the minimum possible time interval. In spite of these precautions, the results of the landing run tests showed rather wide discrepancies, due to irregularities in the ground at point of contact and to gusts of air encountered just as the airplane was landing. The Tanager was accredited with a landing run

of 90 ft., well under the requirement, but still 10 ft. above the landing run of one other competitor.

THE THIRD PART of the safety tests was intended to demonstrate the ability of the airplane to land in and take off out of a small area surrounded by obstacles. The obstacles at the edge of the field were simulated by lines of sight radiating outward from the top of a 35-ft. tower located in the center of the field. In measuring the distance used "in landing in a confined space," the airplane glided into the field by the tower and an observer on the tower followed it with a sight level until the airplane had settled down to the 35 ft. altitude. He then fixed the position of the sight, thereby determining the line of the imaginary obstacle over which the airplane had just passed. At the same time the observers on the ground determined the line of approach of the airplane, its point of contact with the ground and final stopping point. Distances were measured along the landing line from its point of intersection with the plane of the imaginary barrier. These landings were made with the engine ignition switched off, and the results of the tests were corrected for wind velocity, using the method already outlined in the measurement of landing run.

Distances required to take off over an obstacle were determined in a similar way, except in this case the observer on the tower followed the airplane with his sight, and stopped its rotation at the instant the airplane rose above the 35-ft. level. The distance corrected to zero wind velocity required to land the Tanager over the obstacle was found to be 293 ft., and the take-off distance over the obstacle 500 ft. The take-off distance just within the limit of the competition was greater than that of one other plane tested by 60 ft. However, due to its rugged landing gear, which made it possible to land the "Tanager" from a steep glide, the landing distance over the obstacle—295 ft.—was the shortest recorded for any plane.

A further requirement of the safety tests placed limits for the steepest and flattest glides that could be made. These angles of glide were determined as the anti sine of the ratio $\frac{\text{speed of descent}}{\text{speed along the flight path}}$. Speeds of descent were measured by barograph in the same way as rates of climb, and were corrected for air temperature. Airspeeds along the flight path were determined by the trailing Pitot-static head and were corrected for air density. Considerable difficulty was experienced in getting good checks on glide characteristics, presumably because of the effect of rising and descending currents in the atmosphere. The "Tanager" and other airplanes tested had no difficulty in meeting the flat glide condition of 8 deg. No airplane tested, however, was able to meet the steep glide condition, and the angle of glide of 13.2 deg. for the Tanager was the steepest recorded for any of the planes.

As no credit points were assigned to this performance characteristic and as its accurate determination was very difficult, this requirement was modified in the rules from 16 deg. to 12 deg., in order to permit its accomplishment by those planes which had passed the preliminary requirements.

The stability tests carried out on the Tanager were divided in two parts, the first having to do only with longitudinal stability, and required that the airplane be dynamically stable when trimmed for glide, level flight or climb, with various throttle settings. During these tests the rudder was controlled for straight flight. The airplane was reasonably stable over the complete range of speeds and oscillated with a period of about 20 sec. when disturbed from normal flight. The damping coefficient was not as great as might be desired, since the airplane, when flying at high speed and with throttle closed, required three or four complete oscillations to settle down.

The second stability requirement specified that the airplane must fly in gusty air with all controls free, trimmed for any flight condition between 45 m.p.h. and 100 m.p.h. In this test rubber cords were used on the elevator and rudder to assist in trimming the airplane and correct for the turning effect of the slipstream. This condition was met in a satisfactory manner by the Tanager, except possibly in one respect. If adjusted for a straight flight at low r.p.m., the airplane would, on being thrown into a turn by an air gust, remain in the turn indefinitely without increasing or decreasing its rate of turn. The stability characteristics of the "Tanager" were noticeably better than those of any of the others.

WITH RESPECT to controllability the Tanager was especially good except at the minimum speed. Here the floating ailerons were very effective and the rudder satisfactory, but sufficient fore and aft control was not provided when the motor was throttled. This is clearly shown by the wide diversions between minimum speeds in level flight and in glide. With the throttle closed it was impossible to bring the airplane to its stalling attitude even with the stabilizer way up and the stick way back. If when flying under this condition the airplane was disturbed by a gust in such a way that the nose dropped, it was impossible to bring the airplane back to

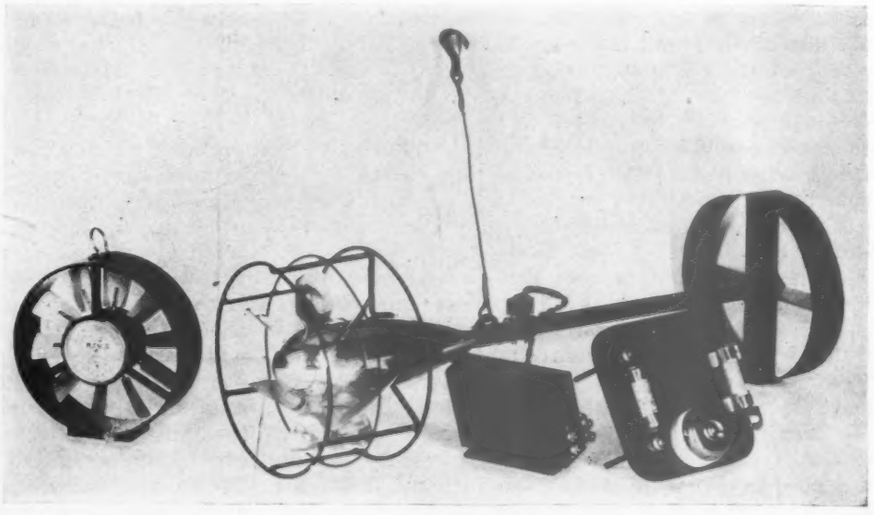


Fig. 6: Wind anemometer and Barr & Stroud suspended air log

Some of the personnel of the Guggenheim safe aircraft competition at Mitchell Field

its original attitude without an increase in airspeed. In spite of this deficiency in fore and aft control in a minimum speed glide, the "Tanager" was better in this respect than the other airplanes tried. No difficulty was experienced in maintaining control of the plane when it was trimmed to fly at any speed and the motor was suddenly cut. The good directional control of the "Tanager" when gliding at low speeds was undoubtedly due to the triangular shape of the stabilizer, which gave a minimum of blanketing to the vertical surfaces.

In the tests demonstrating the ability to recover from abnormal conditions the "Tanager" returned to normal flight after having been dived and given free controls. In the recovery from abnormal attitudes, level flight could be resumed with a loss of altitude of less than 300 feet, when the controls were used. However, when the airplane was placed in an abnormal attitude, the motor throttled, and the controls left free, it was found necessary to have correct adjustment of the elevator bungee, in order to insure complete recovery without loss of more than 500 feet in altitude. If in this test the airplane was pulled up sharply into a stall, the motor cut, and all controls moved to extreme positions and released, a rather steep dive resulted from which the airplane was slow in recovering. The proper adjustment of the bungee cord on the elevator assisted very greatly in the recovery, due to its having an effect equivalent to an increase in area of a fixed horizontal surface. The proper adjustment of this bungee cord was so critical that compliance with the conditions of this particular test could not always be guaranteed.

THE FINAL safety requirements demanded that the airplane be maneuverable on the ground in a twenty-mile-per-hour wind and that it be able to take-off from a square plot 500 ft. on each side and pass over a 25-ft. obstacle along its entire boundary. Also the airplane had to be able to return to this area and land over the barrier, if the engine was switched off after any altitude above 25 ft. has been reached. In conducting this test the motor in the Tanager was cut when an altitude of 100 ft. had been attained, and no difficulty was experienced in meeting the requirement.

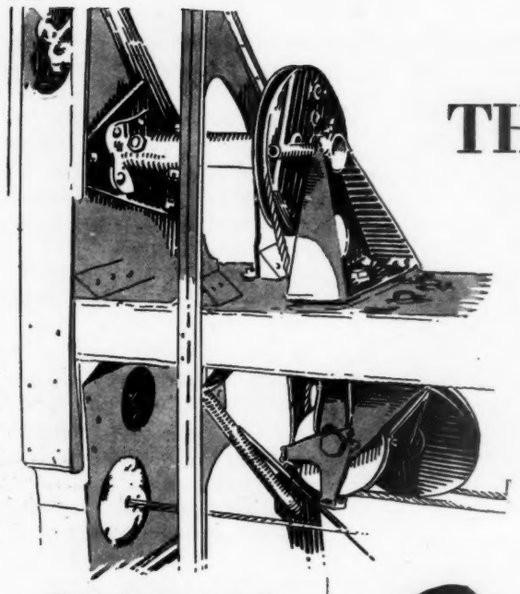
The tests of the Tanager and other airplanes in the competition brought out many interesting facts regarding both the design of aircraft and methods of conducting flight tests. They showed how closely it is possible to design an airplane to any given set of specifications. The Tanager met all the original requirements of the competition, except that of steep glide. This condition had been defined arbitrarily and it was found that it could not be met by any of the entrants which complied with other essential conditions. It was finally slightly modified, with the approval of all the judges and of all surviving competitors. Furthermore, the Tanager had very little reserve in passing any of the tests. A second fact brought out has to do with the actual performance value of slots and flaps and other lift increasing devices. On the different airplanes submitted almost every known device of this sort was present in some form. Only two airplanes were able to meet the speed range requirements and to compete seriously for the prize. These two airplanes were both equipped with slots and flaps. In one airplane there was manual control of the flaps; in the other both slots and flaps were automatic in action. A real determination of the value of these devices was obtained by speed measurements made with the slots and flaps operative and also locked to prevent their action. These additional data are given below for the Tanager:

Minimum Horizontal Speed	
Slots open, flaps down	30.6 m.p.h.
Slots open, flaps up	34.8 m.p.h.
Slots closed, flaps down	35.4 m.p.h.
Slots closed, flaps up	41.5 m.p.h.
Minimum Gliding Speed	
Slots open, flaps down	37.1 m.p.h.
Slots open, flaps up	42.1 m.p.h.
Slots closed, flaps down	41.5 m.p.h.
Slots closed, flaps up	48.8 m.p.h.

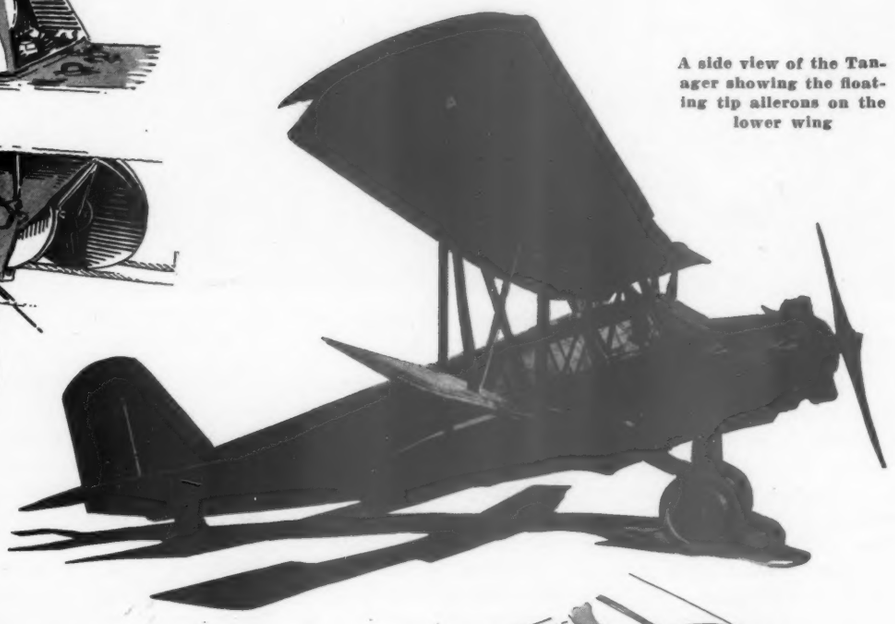
These data should remove the skepticism that has existed in this country with respect to the real value of slots and flaps. In addition to these data indicating possible increases in the lift coefficients, the tests showed the disadvantage of having flaps interconnected with the slots and automatically operated. When so arranged, there was a tendency for them to go out of action at the stall, producing a lack of control for that condition, for which control is very important. The tests also showed the necessity of extremely powerful fore and aft controls in order to take advantage of the full value of slots and flaps and the necessity of an extremely rugged and tall landing gear.

With respect to test procedure it has been found inaccurate to substitute a measurement of minimum speed in level flight for actual landing speed with engine throttled, as has been common practice in some acceptance testing. This is especially true in cases where the landing speed of the airplane is low and where the fore and aft control is insufficient. It has also been found that the use of any approximate formula for determining speed for maximum rate of climb is unreliable when used in connection with airplanes equipped with high lift devices.

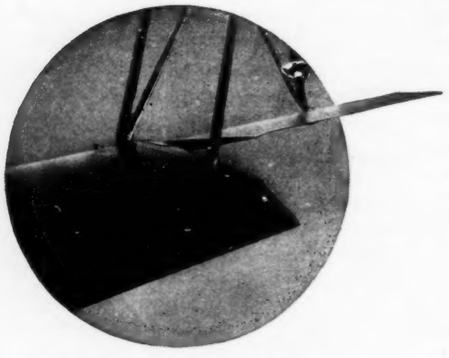
THE "*Tanager*" AND



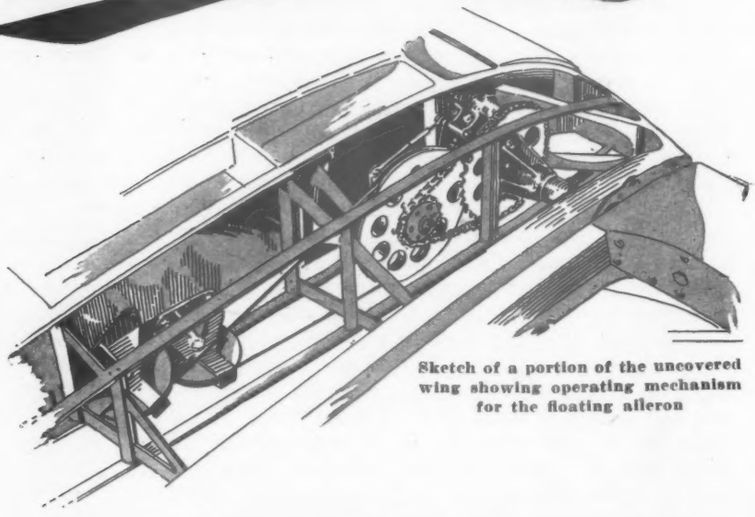
Sketch showing the mechanism used to actuate the trailing edge flaps



A side view of the Tanager showing the floating tip ailerons on the lower wing

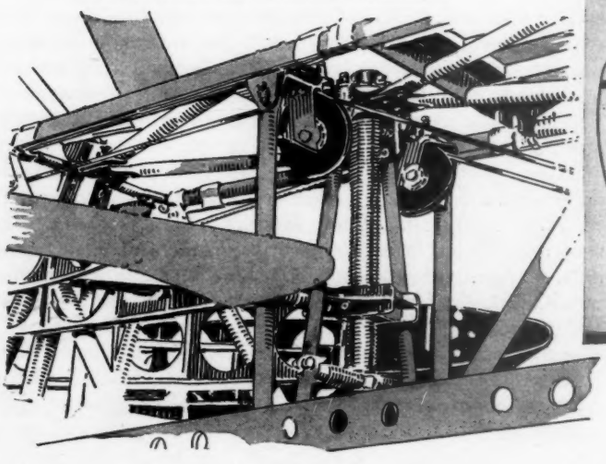


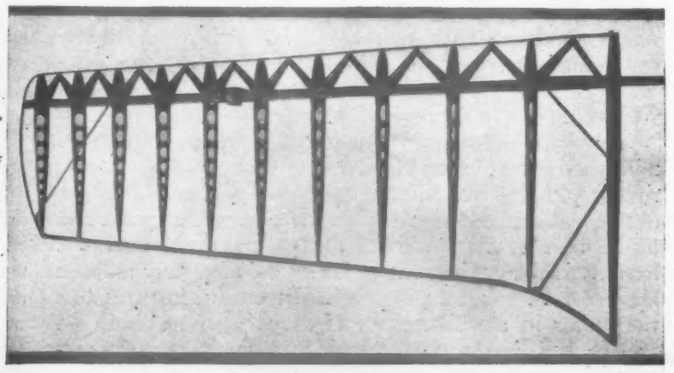
Detail view showing the trailing edge flap and floating aileron on the lower wing



Sketch of a portion of the uncovered wing showing operating mechanism for the floating aileron

The unusually long stabilizer travel is shown in the sketch of the operating mechanism

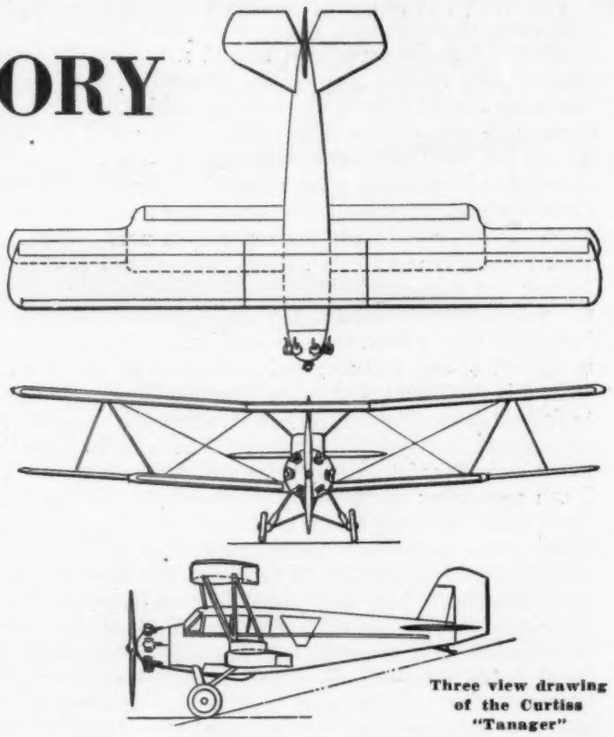




The uncovered structure of the Curtiss floating aileron as used in the Tanager

SOME OF ITS HISTORY

A Technical Description and a Chronological Discussion of the Incorporation of the Design Features



Three view drawing of the Curtiss "Tanager"

By ROBERT R. OSBORN
Designer, Curtiss Aeroplane and Motor Co.

ANY TECHNICAL ARTICLE on an airplane by one of the engineers responsible for it, or the manufacturer producing it is always open to the charge that the writers judgment was considerably warped by his enthusiasm. The same charge can be applied in this case, of course, but my enthusiasm is restrained somewhat by the fact that extremely accurate flight test data is available on the plane, as a result of three months of flying with the best obtainable instruments and by flight test personnel with years of test flying experience. When one considers that the data was obtained by such recognized flight testing and instrument authorities as Lt. Stanley Umstead, U. S. Army, Professor William Brown of Massachusetts Institute of Technology, Mr. Edward Rounds, U. S. Navy, and Mr. Thomas Carroll of the N.A.C.A. and under the supervision of Captain Walter Bender, U. S. Army, Prof. Alexander Klemin, Maj. E. E. Aldrin, U. S. Army and Major R. H. Mayo, O.B.E. and considering that in the three months the tests were run a number of times on each item of the flight test manual, and tried under many different conditions, the accuracy of the data cannot be questioned. A few years ago it was reasonably safe to subtract 5 m.p.h. from the top speed and add it to the landing speed when one was reading data supplied by the engineer or salesman connected with the airplane. Nowadays the advertising is getting more competitive and it is far safer to subtract and add ten miles an hour to the two speeds. The data obtained by the Guggenheim flight test section is given at the end of this article along with some general characteristics of the Tanager, and if these performance figures may seem disappointing in the light of some of the present day advertising, charge it to the fact that the writer of this article realizes that there are others at large who have complete knowledge of the Tanager's actual performance.

It is believed that this technical description of the airplane will prove most interesting if it is presented in historical form, showing at what stages of the design the various types of construction were adopted, and if possible, why they were adopted. This form of discussion will be used, but before going into it, permit me some comments on the performance of the machine and its future possibilities which cannot be found in the cold data given in the table of flight test results.

FIRST, the airplane cannot be spun accidentally. I use the term "accidentally" advisedly as it is entirely possible that some day an expert pilot may get the machine in some unusual condition,—on its back for instance, and subject it to some violent maneuver which might develop a peculiar and probably dangerous autorotation. However, Mr. Paul Boyd, Curtiss test pilot, tried unsuccessfully all known methods of putting a plane into a spin, and Lt. Stanley Umstead subjected it to the rigorous tests required in the Guggenheim flight test manual, several of which tests were designed to develop spinning tendencies if there were any. The Tanager has developed no spinning tendencies thus far, although it has been given a thorough trial by a number of other expert pilots also. Therefore it cannot be spun accidentally by anyone, and possibly not purposely by anyone. In making this statement I am not hiding some other unusual condition, such as an uncontrolled nose dive, as this does not occur either. The plane naturally flies slower, power on, than in the power off condition, and if the power is suddenly cut when the machine is completely stalled, full throttle, the nose will drop until the higher speed and the attitude which accompanies it are attained. However the nose does not drop so much that if it were accomplished close to the ground anything dangerous would result. This test was made during the competition several times and the Tanager made two point landings in each case with the skid about a foot and a half high.

Second, the necessity for accurate judgment of heights has been eliminated in flying this plane, and the old bugbear of depth perception should not keep the prospective pilot of this type on the ground. The Tanager has been landed repeatedly by completely stalling it at varying heights up to 200 ft.,—stabilizer and elevator all of the way tail heavy and held in these positions. When this is done the plane settles in a landing position, does not pick up speed, and lands itself with no more shock in the cabin than accompanies a normal landing in the usual type of craft. True the ground comes up so fast that one expects the wheels to come right through the wings the first time it is done, but the landing gear is designed to cushion the shock of this gliding condition if started at any altitude, and it is believed that it will.

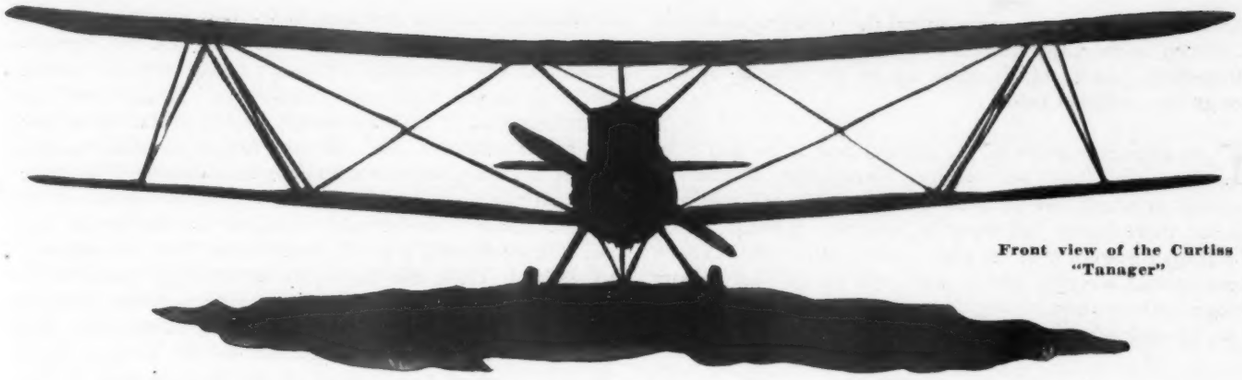
In this gliding condition the Tanager has no tendency to fall off on a wing and no particular skill is required to accomplish this type of landing. This can be done in gusty air with safety, or with the flaps either down or up. I can remember numbers of comments in the last two years, since the competition was announced, in which the opinion was expressed that this type of craft, with such a slow landing speed, would be dangerous in windy and gusty weather. The theory was that a change of wind velocity of, say, 5 m.p.h., would have a disastrous effect on a craft with a 38 m.p.h. landing speed, while it would have almost no effect on a plane landing at 60 m.p.h. Therefore an airplane with such a low landing speed might be interesting but not so practical and safe as one with the higher landing speed. This was one of the points we had in mind when we selected controllable flaps for the Tanager. In windy weather one could simply leave the flaps in neutral and effect his landing at 43 m.p.h. instead of 38. Actually, flight test showed that this condition was not so dangerous as everyone had supposed it would be. Gusty weather does, of course, affect the plane when it is flying at slow speed, but not nearly so much as one might expect, and easy and fully controllable landings can be made in such weather with flaps either operating or not, as wished.

THIS TYPE of landing can be made in case of engine failure at take-off nearly as well as it can be made from considerable height after flying for some time. If the stick is held back from the instant of taking off and the power is suddenly cut, the plane will land itself in the same way described before. If the failure occurs close to the ground the landing will be two-point and a hard landing, but not too hard to be accomplished without damage under full load condition. This test has been made with flaps down to their best position only. It must be admitted that the ship might land hard enough to be damaged if the flaps were neutral when this type of landing were tried just after take-off.

Incidentally this is a good point at which to correct another misapprenhension which seems to exist about the Tanager. One or two writers, in commenting on the type, say that our flap causes large displacements of the center of pressure, and it is only that we have used them in conjunction with slots, which have a counteracting effect on the center of pressure that we are able to employ them without dangerous conditions resulting. We are quite proud of the flap developed for the Curtiss 72 airfoil section and used on this machine. As used on the Tanager this flap does not decrease the top speed even though a large slot is continuously open in front of it, and a nice balance was obtained between the change in center of pressure caused by the flap and its downwash effect on the tail surfaces. The flaps, which cover the entire trailing edges of the wings can be cranked down in any flight attitude of the plane, with any changes in balance being easily taken care of by relatively small movements of the stick. No change of stabilizer position needs to be made in the process of cranking down these flaps, and the front automatic slot does not come into action at all. However the stick loads become heavier and it is advisable to correct for this by changing the adjustment of the stabilizer.

THIRD, we have simplified the pilot's operation of the controls in a way which I believe is going to have a great importance in the near future. Actually we have added one extra control, the crank for the flaps, but this control can be left in any position or not used at all without endangering the machine. In exchange for this one added control, we have eliminated the necessity of using the rudder in executing all normal flying maneuvers. The Tanager can be flown into all normal flying positions and out of them, including tight vertical banks, without the use of the rudder. Some normal types of airplanes can do this, but with considerable slipping into the bank and skidding out of it. When the Tanager is rolled with the new Curtiss floating ailerons, the ship yaws in the right direction and keeps in a normal turn so long as this bank is maintained. It is well known that the improper use of the rudder is the cause of most of the accidents to the inexperienced pilot. When close to the ground he may make a turn improperly banked, and with his craft nearly stalled, the nose drops uncontrollably or a wing drags and an accident cannot be avoided. Curtiss Flying Service pilots who have had considerable experience in student training, used to come into the Design Section with this tale of woe very frequently. They would get their students all ready for solo, and before final check-out would purposely put the plane in a bad position just off the ground, turn it over to the student, and find him making the same instinctive turn without banking properly. The suggestion was repeatedly made that the rudder be taken away from the unskilled pilot, and that it be coördinated with the ailerons mechanically. This would, of course, prevent him from being able to side-slip his plane, but the claim was that the side slip was another maneuver which should be only in the repertoire of the skilled pilot, and that the unskilled pilot, for whom the popular plane of the future must be designed, did not know how to use the side slip properly and effectively anyway. We believe we have accomplished a control which is better than coördinating the rudder and aileron mechanically—we have an aileron which does not need to be corrected for nor coördinated with by the rudder. We are not suggesting at this time that the rudder should be removed or held fixed—it still may be useful in taxiing and other ground maneuvers, even though the plane is equipped with wheel brakes, and the skilled pilot may be able to use it very effectively and safely. However, we can instruct the unskilled pilot to do his flying entirely with his feet off the rudder control. We can provide him with a wheel and tell him to follow the normal instinctive motions which go with driving his car. He steers to the right or left, and the airplane banks itself properly and turns to the right or left respectively. He pushes forward to go down and pulls back to go up.

The Tanager is not "fool-proof" and no moving mechanism ever will be—a fool can kill himself on a Kiddie Kar if he tries. This airplane will be just as dangerous as any other in the hands of the pilot whose



Front view of the Curtiss "Tanager"

idea of flying is to see if he can tear the wings off of a machine designed for commercial load factors, or who continually tries to see how close he can come to hangars and high tension wires. The newspapers have expressed themselves editorially as disappointed that nothing more radical than a new system of lateral control should develop out of the "Safe Aircraft Competition." This is an unfair and entirely unreasonable criticism. The much better and much safer steamships, railroad trains and automobiles we have today are only logical developments and improvements of the first ones invented, and do not look unlike them, and it is not logical to state that a safe aircraft competition failed because it was not won by something resembling a ferris wheel. On the contrary we should be glad we do not have to scrap all of our theories and design data. The requirements of a safe aircraft can be met by a not radical airplane—a practical one which can carry a useful load, and have a reasonable high speed of 112 m.p.h. and cruising speed of 95 m.p.h., in addition to its safety factors. We believe that the Daniel Guggenheim Safe-Aircraft Competition has accomplished its object—"to achieve a real advance in the safety of flying through improvement on the aerodynamic characteristics of heavier-than-air craft, without sacrificing the good practical qualities of the present day aircraft."

One more point should be discussed—the cost of putting a plane on the market equipped with these devices. There is no question but that the ship is a more complex mechanism than the usual type of airplane, but even at that, not so complex as is commonly imagined. However, complexity always adds cost, but may sometimes be worth it. Another point too, is that a less experienced pilot can be employed safely.

As it is the popular opinion that the high officials of a company merely play golf and collect dividends, it is pleasing to note that the "Tanager" project really started in May, 1927, with letters written by Mr. C. M. Keys, president, and Mr. F. H. Russell, vice-president, recommending that the competition rules be studied by the Curtiss engineering department to see if an airplane could be built to pass the rigid requirements. Preliminary study of the Fund booklet and frequent discussion meetings showed that the problem was essentially an aerodynamic one. Slower flight speeds could be obtained, with a given wing area, by reducing weight or increasing lift or by a combination of both,—but large improvements were necessary to meet the demands of the Guggenheim Competition. The weight analysis had to offer only the possibility of using materials or types of construction proven to be lighter but which had their use precluded by the expense of construction, in ordinary production. Not much could be promised along this line, as the lightest materials and construction are almost always used regardless of expense. They could suggest types of design and structure which had been proven to be lightest, but as this department had been performing this function in all normal design airplanes, not much hope was held for great improvement from this source. The structural analysts had little to offer, as repeated tests had fairly well established the lightest types of structure and nothing outstandingly light and unique could be promised. However, the aerodynamics section had a number of devices on its research program which showed considerable promise, and so the preliminary investigation was turned over to this section.

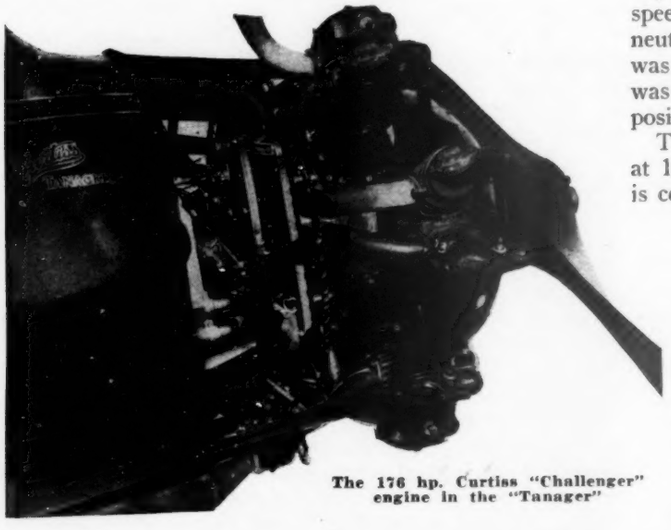
An intensive research program was started in September, 1927, in the Curtiss wind tunnel on devices which would improve lift, stability and controllability. Six or seven different types of slot and flap inventions were studied and investigated. Numerous models were built of the more promising types in an attempt to improve them to the point where their use would enable us to design an airplane to pass the requirements. The first tests were also started at this time on the new floating aileron, which immediately showed great possibilities. The refinement in the types of automatic slot, and slotted rear flap obtained by literally hundreds of tests and trials, had now developed lift coefficients which, coupled with some rough weight estimates, showed us that, with extremely careful design, a plane could be built to pass the minimum requirements of the competition.

In April, 1928, we wrote to the Fund, signifying our intention of entering the competition, and asking for an exact interpretation of certain of the rules which were not quite clear. Obtaining this information we immediately set to work looking for the type of plane which could make best use of our new devices for increasing lift,—slots and slotted flaps, and the amazing new type of lateral control which enabled us to use these increased lift devices to their fullest extent. The first decision made was that it was most desirable to build a practical airplane and not a freak, designed to last only for the duration of the contest, would not only be a violation of the spirit of the competition but would not have advanced the aeronautical art at all. We wanted a practical solution of the problem, with a product which would immediately prove useful.

In the course of the study for selecting the final form of the design five different layouts of complete airplanes were made with weight analyses. Tunnel models were built of the more promising layouts and these models completely tested in the tunnel. The best model was

selected, of course, and represented the Tanager as finally delivered to the Guggenheim Flight Test Section. Some interesting points which came up in the course of the design are outlined below:

THE REQUIREMENTS of the competition rules that 5 lb. of useful load per engine horsepower should be carried, in which useful load could be included fuel and oil for three hours full throttle, and two persons, made the proper selection of an engine very important. There were certain weights which could not be avoided in any design,—the weight of engine and cooling system and the 5 lb. of useful load per horsepower. If an engine of too low horsepower were selected, the two persons and three hours fuel and oil would equal more than 5 lb. per horsepower and the airplane would be handicapped. If a too high horsepower engine were selected the requirements of low landing speed would make the necessary wing area so large that the plane would be too large and unwieldy. It was on this basis that the Curtis Challenger engine was selected and the design built around it.



The 176 hp. Curtiss "Challenger" engine in the "Tanager"

THE CURTISS 72 section had been selected for all of the slot and flap experiments because it was such a good all-around section. It gave good front and rear beam depths with room back of the rear beam for a good slotted rear flap. An automatic slot and a slotted rear flap had been developed which gave us the following lift coefficients

Basic section Ky	= .0033
plus rear slot open	= .0035
plus rear flap pulled down	= .0044
plus front slot open	= .00605

which represent a 50 per cent increase in lift due to the front slot and an 83 per cent increase due to the front slot plus a slotted rear flap. These may not seem to be large percentage increases in lift, until it is realized that we were starting with a basic section which was already considered the best in its class. This section also had the advantage that its full scale results were always better than its model tests promised, and this proved to be the case also when slots and flaps were added to it.

To get this slot in its best position it was evident that the commonly used linkage mechanism would not be satisfactory. Links approximately five feet long would be necessary to get the slot in its best position, so we developed the sliding link type of auto-slot mechanism, which had the advantage of disappearing entirely within the wing in the high speed condition. It also had the advantage that it gave absolutely stable operation of the slot at all attitudes, and did not flutter in opening and closing. This Curtiss mechanism was also used successfully on the Curtiss "Sea Hawk," a high speed Navy fighter. After considerable research in the tunnel we had also developed a good slotted rear flap. It was not necessary to close this slot in the neutral flap position, as it did not change the L/D characteristics of the wing at high speed. We had also developed a control for this flap which was completely buried in the wing at high speed and wbich had a dead-center position both in the neutral and in the full down flap position, so that there was no load in the control in either of these positions. It was also irreversible so that the flap could be left in any position if desired.

The normal wing section has its maximum lift position at 16 deg. The auto-slot starts opening at 12 deg. and is completely open at 16 deg. angle of attack. It is entirely stable in any attitudes and because of this gradual opening, does not jar the plane. When this slot is open the maximum lift position is at 26 deg. angle of attack. If the rear flap is pulled dow nthe maximum lift position is at 24 deg. None of the lift curves were sharply peaked and none showed dangerous characteristics. The high angles necessary to obtain maximum lift were not disadvantageous, as the normal ground attitude could be built in the ship and the remaining angle necessary for maximum lift could be obtained from the flight path. Our L/D calculations for the entire ship showed that would probably glide in a landing attitude, which was proved to be the case in actual flight test.

The large wing area required made it evident that a biplane wing arrangement would be necessary. It was also desirable to make it a single bay biplane if possible for lightness. Our experience has been that double bay biplanes often have great advantages,—as is evident in our selecting a double bay biplane for the Fledgling training ship,—but that they are heavier than the single bay craft. This is true even though the single bay lift truss gets quite shallow and the beams approach critical lengths. The wings had to have a large aspect ratio and gap for stability and efficiency. Large dihedral for stability, and large stagger for vision and reduced interference between the wings in stalled attitudes.

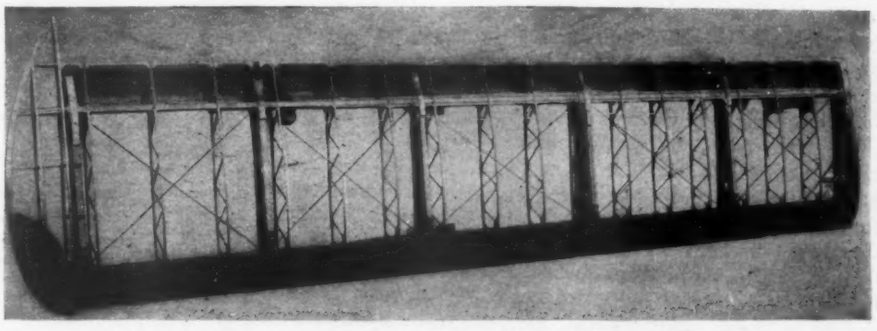
THE NEW Curtiss floating ailerons were the obvious selection for the lateral control. They cannot be stalled in any flight attitude and there is almost no yaw from them throughout the range of wing angles of attack. They were tested thoroughly in the tunnel, in the presence of the wings of the biplane combination, and there would be no yaw from them at all if it were not for the tip vortex of the lower wing and the slight interference with the upper wing. They were compared with the best balanced and differential ailerons of normal type, mounted on the same biplane combination. The rolling moment of the normal ailerons fell off considerably at the stalled attitude of the wings from their moment at zero angle of attack of the wings, whereas the floating aileron had constant effectiveness in roll throughout the range. Therefore the area of the floating aileron could be selected so that the lateral control of the airplane could

be fifteen per cent *less* effective at high speed and fifty per cent *more* effective at low speed than if normal ailerons were used. The normal ailerons had serious yaw at some attitude of the wings, depending on the use made of the protruding balance, whereas the floating ailerons had almost no yaw, what little there was being in the proper direction. These ailerons also make a plane faster, when they are used in conjunction with slots and flaps, than if the normal type of control is used, assuming equal landing speeds. This feature is extremely important, and is brought about in this way. If we fit all of the wings with leading edge slots and trailing edge flaps, and have some auxiliary means of lateral control, we can use all of the wings for lift and can realize the full value of the maximum lift coefficient, of .0060. If we must save a portion of our flap for lateral control it is obvious that it must be left in neutral or nearly so. This part of the flap can not be pulled down and stalled, as are the rest of the flaps, as it is obvious there will be nothing left for lateral control. Therefore the portion of the wings having ailerons can be calculated for only the reduced lift coefficient of .0051, and, for a given landing speed, the wing area must be larger. On the Tanager about 40 sq.ft. more wing area was required using the normal aileron than with the floating aileron with the latter giving us more control at the stall. This relatively high drag wing area was replaced with forty-five square feet of low drag aileron. This aileron has a symmetrical thin section and its drag, with supporting struts, is less than that of the increased wing area required with normal ailerons. Therefore they pay for themselves in speed, cause almost no yaw, need no corrective rudder, give us about fifty per cent more control at the stall and are far less tricky and sensitive at high speed. Altogether a very pretty picture.

As there seems to be considerable mystery about the operation of this floating aileron, let me describe it in a few sentences. A faired, symmetrical airfoil section is used, balanced aerodynamically by placing the axis of rotation aft of the leading edge, and balanced statically by an extra weight added to the leading edge. These controls float freely in the air stream at all times, and the pilot has no control over this action. His control enables him to *displace one aileron with respect to the other* and not with respect to the plane, in which condition they still float freely. That is, if he moves his stick so as to cause a 10-deg. angle between the two ailerons, one will float 5 deg. up from the relative wind and one down 5 deg., and this condition will maintain even if the attitude of the plane changes. Therefore the plus and minus angles are equal on the two sides of the plane, and as a symmetrical section is used, the up and down lifts are equal, the profile and induced drags are equal, and we obtain roll without yaw. If these airfoils were by themselves there would be absolutely no yaw,—the presence of the other wings causes a small interference yaw in the right direction. When a laterally stable plane is rolled with these ailerons, the wing lift has a horizontal component which pulls the airplane into a natural turn which becomes a steady condition, depending on the degree of bank used. Also let me say that the control is accomplished with a very simple device, and not with any trick clutches or other devices subject to wear. It is only slightly more complicated than the usual direct connection to the control stick.

Tail surfaces were normal except that large movement of the stabilizer was required. These surfaces were designed by control necessary at stalled attitudes and the rigid stability requirements. In this connection all of the stability criteria available was studied and the articles on Spiral Instability, by B. V. Korvin-Kroukovsky, which appeared in AVIATION were particularly useful. Even at that, it was difficult to trust empirical data when applied to this craft with the new ailerons. And it was more or less of a guess to design a rudder when there was no aileron yaw to overcome.

CONSIDERING that landings would be made with the Tanager with large vertical velocities, an oleo and rubber undercarriage with a large travel was selected. It was necessary also to select one with little or no sideways travel of the wheel accompanying the vertical travel, or the tires would be torn off when landing with almost no forward speed. It will be noticed that this oleo strut is inverted and that the plunger extends below as a full cantilever. The oleo strut carries heavy bending from braking loads and also whenever the load of landing is not directly in line with the strut. This caused no trouble and the strut worked perfectly. This landing gear also has the great advantage that it delivers only pure shears to the fuselage and carries no bending nor torsion to the longerons.



Right upper wing section of the "Tanager' before covering

The tail skid is also an oleo and rubber gear, with a twelve inch vertical motion, as was used also in the landing gear. It is swiveling but is not controllable.

An enclosed cabin was selected for comfort and practicability, even though this involved some weight sacrifice. The passengers were placed in tandem, for better vision and cleanness of cabin line.

Fuel tanks were placed on the side of the plane, so as to concentrate the variable load, from a stability standpoint. Wing tanks, in a biplane of large gap, are known to be one cause of peculiar spinning characteristics.

The cowling as first built, was of the N.A.C.A. type. This did increase speed, but interfered with the take-off and climb. There was speed to spare, so this cowl was eliminated in favor of the better take-off, climb, and the weight saving, which affected the glide.

Formal entry was made of the general design in September, 1928, and the actual detail design was started when it was accepted. As the types and materials of

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construction used in the Tanager were not unusual this part will not be gone into in great detail. Briefly, the materials used were:

Wings: Cloth covered wood beams and ribs. Wood box spar drag struts used with steel wires. Sheet dural flaps, cloth covered. Wood and sheet dural auxiliary airfoils for slots.

Fuselage: Combination of dural and steel tubes.

Landing Gear: High tensile steel. Oil and rubber.

Tail Skid: High tensile steel. Oil and rubber.

Tail Surfaces: Welded steel tubing construction for all but stabilizer, which was built of dural sheet. All cloth covered.

Ailerons: Dural ribs and beam. Cloth covered.

First test flight made by Mr. Paul Boyd, Curtiss engineering test pilot on October 12, 1929. Tests were continued by him until the plane was delivered. Too much cannot be said of Mr. Boyd's contribution to this project as his flight tests enabled us to make our final adjustments in the short time we had, and his demonstration to the Fund officials was certainly convincing. He is a good engineer as well as a skilled pilot which makes an ideal combination in a test pilot. Taking a new plane off the ground,—one with so many new and untried features, and testing out all possibly dangerous flying conditions on the first flight, requires a type of courage I should be proud to have.

Our tests showed that the N.A.C.A. cowl was not advantageous and that slightly more down stabilizer was required. With no other changes the craft was able to pass all of the competition requirements.

The plane was formally delivered to Captain Bender at Mitchel Field on October 29, 1929, and was carried through its tests without a hitch. The relatively long time required for the tests is accounted for by the poor ground and air conditions which prevailed throughout the three months and by the thoroughness with which the Guggenheim flight test personnel did their work. Two fittings in the landing gear were bent in one hard landing,—out of a semi-whip-stall close to the ground, but the undercarriage did not fail, and the plane was taxied in for repairs. Outside of this incident, no damage of any sort occurred, and the same test was repeated when the fittings were repaired.

OBVIOUSLY, any modern airplane is the work of many people, and the successful Curtiss Tanager was no exception. It is impossible to mention everyone who contributed to it by god work or valuable suggestions, but a few of the outstanding ones can be given a highly deserved "credit line." First, Mr. T. P. Wright, Curtiss Chief Engineer, deserves particular credit for his forward looking policy and courage in authorizing and promoting the Guggenheim competition ship project, realizing the large expenditures necessary to make this plane a success. An executive with less vision and less direct technical knowledge would have cared more for present production, and less for research which might take years to repay the investment in it. The Tanager has paid for itself already and promises further dividends in the near future, but it took vision to realize this two years ago, when the production of any airplane was in so great demand. Particular credit also belongs to Mr. Arne Vinje, who was Assistant Designer, and whose long experience in airplane design was of great value. Others are Mr. William H. Miller, former head of the Curtiss Aerodynamics Section, and Mr. Robert E. Johnson, who succeeded him, Mr. H. R. Moles, who was a lead man in both drafting and shop, Mr. R. C. Blaylock, who handled the intricate and difficult wing structural analysis, and Messrs E. J. Ashman and R. G. Buzby of the Weight Section.

The following shows characteristics and performance of Curtiss Tanager from actual flight tests:

Wing loading (lb./sq.ft.)		8.5
Power loading (lb./hp.)		16.1
Aerofoil section		Curtiss C-72 (wing slot and flap)
Load factor		7
Length overall		26 ft. 8 in.
Height overall		11 ft. 4 in.
Span, overall		43 ft. 10 in.
Chord (in.) upper		60
Chord (in.) lower		60
Mean aerodynamic chord (in.)		60
Gap (in.)		69
Stagger at leading edge (in.)		29½
Incidence (deg.) upper		−2
Incidence (deg.) lower		−2
Dihedral (deg.) upper		4
Dihedral (deg.) lower		4
Sweepback (deg.) upper		0
Sweepback (deg.) lower		0
Wing area, including flaps (sq.ft.)		333
Ailerons (total sq.ft.)		45
Horizontal tail (sq.ft.)		47.6
Vertical tail (sq.ft.)		20.4
Elevators (total sq.ft.)		23.4
Rudder (total sq.ft.)		14.1
Engine		Curtiss Challenger
Horsepower		176 at 1830 r.p.m.
Fuel consumption, full throttle (lb./hr.)		89.3
Oil consumption, full throttle (lb./hr.)		3.4
Fuel capacity, (U. S. gals.)		54
Oil capacity (U. S. gals.)		3
Propeller diameter		8 ft. 4½ in.
Cooling system		Air cooled
Weight, empty		1,959 lbs.
Useful load	882 lbs.	For the Guggenheim Competition
Pilot and observer	370 lbs.	
Fuel and oil	359 lbs.	
Equipment	68 lbs.	
Ballast	85 lbs.	
Gross weight	2841 lbs.	

Curtiss Tanager Flight Test Data

Obtained by the Guggenheim test section

Minimum Flying Speed:		
Slot open, flap down	30.6	m.p.h.
Slot open, flap neutral	34.8	m.p.h.
Slot closed, flap neutral	41.5	m.p.h.
Slot closed, flap down	35.4	m.p.h.
Minimum Gliding Speed:		
Slot open, flap down	37.1	m.p.h.
Slot open, flap neutral	42.1	m.p.h.
Slot closed, flap neutral	48.8	m.p.h.
Slot closed, flap down	40.3	m.p.h.
High Speed	112	m.p.h.
Take off distance, still air	300	ft.
Distance to clear 35 foot (still air) obstacle from start of tak off run	500	ft.
Run after landing (still air)	90	ft.
Distance landing over 35 feet obstacle and stopping—distance measured from base of obstacle (still air)	295	ft.
Climb—Not known definitely	Approx. 600 ft./min. at 1,000 ft.	
Flattest glide	Approx. 6 deg. to the horizontal	
Steepest glide	Approx. 14 deg. to the horizontal at speed of 37.1 m.p.h.	
Longitudinal stability	OK	

General Stability:

Will fly at any air speed from 45 to 100 m.p.h. at any throttle opening for five minutes in gusty air, hands off controls.

Control in Case of Engine Failure:

Takes up a steady gliding altitude with all power switched off and controls free. If elevator is pulled back will glide at speed of 37 m.p.h.

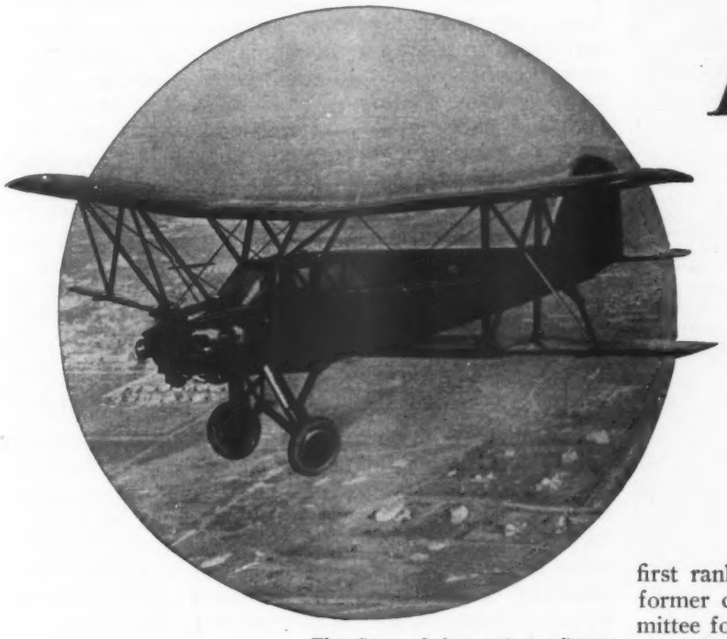
Ability to Recover from Violent Disturbances:

Dived to speed 20 per cent above level flying speed will take up a steady glide if all controls are released. Will do this trimmed for any speed between 80 m.p. h.and 110 m.p.h. Trimmed at full throttle at any speed from 45 to 75, power cut off and abnormal altitude obtained by moving controls. Will recover by itself in less than 500 ft., controls free, or 250 ft. controlled.

Maneuverability in Restricted Territory:

500 foot square surrounded by 25 foot obstacle. Will take off from and land in same square with engine cut soon after take off. Can be taxied in a 20 mi. wind without assistance.

THE *Tanager* AND THE *Dub Pilot*



The Guggenheim contest winner during one of its test flights over Mitchell Field

By
EDWARD P. WARNER
Editor of AVIATION

IN THE RULES for the Guggenheim Safe Aircraft Competition there was one serious defect. It was inevitable, but it was none the less unfortunate. Here was a contest planned to produce an airplane which would require a minimum of skill and special training, an airplane which, in fact, anyone could fly. For obvious reasons, however, the testing could not be done by pilots with neither skill nor experience. All the trials were, in fact, made by three pilots of very unusual qualifications an Army officer considered to belong in the first rank of flying ability as the Air Corps rates it, a former chief test pilot of the National Advisory Committee for Aeronautics, and the civilian head of the flight test office of the Navy Department, who had for many years been piloting all types of aircraft under all types of conditions. With all due respect to those gentlemen's vast attainments, it must be admitted that it is difficult for them to put themselves into the place and the state of mind of a genuine novice. It is difficult for them, however they may try, to feel properly dependent upon aerodynamic safety devices. They do not need a "fool-proof airplane." I do.

BEING a very bad pilot and quite willing to admit the fact, I welcomed enthusiastically the opportunity afforded by the officials of the Curtiss Company of appointing myself to the role in an aeronautical experiment that the lowly guinea pig plays in the biological

This represents an unprecedented action upon AVIATION'S *part, both as to the amount of space devoted to a single new airplane and as to the offering of a review of its flying qualities by a member of* AVIATION'S *editorial staff. All precedents have been cast aside because of what the Tanager represents. We discuss it here not as the commercial output of a commercial company nor as a design having to be considered as a completed whole, but as an example of what competent engineering force may accomplish when they turn their concentrated attention upon development of design for safety. We discuss the Tanager here as a symbol of the trend of the times and as one of the foremost fruits of that Guggenheim Safe Aircraft Competition which takes a most commanding position among the great aeronautical events of 1929.*

laboratory, and trying upon myself the behavior of the Tanager in unskilled hands.

Some apology is due for employing the term "foolproof plane." Literally speaking, as Capt. E. S. Land forcefully pointed out upon the occasion of presenting the Guggenheim Fund's check to Mr. C. M. Keys for the Curtiss Company, there is no such thing. Of course the term does not literally mean what it says (if it did, I should be less eager to acclaim its application to myself). The most that can be hoped for is that an ordinary individual of reasonably good judgment and cautious temperament may be able to fly with a very high degree of safety without having undergone any elaborate preliminary instruction and without making such demands upon his physical and nervous qualities as are implied in the present standards universally imposed for pilots' licenses. Nothing that can be done to any mobile machine will ever make it wholly secure against accident. A collision of two Curtiss Tanagers would be just as fatal as a collision of two Curtiss Robins.

Suppose that you have selected such an individual as is described in the preceding paragraph and undertaken to teach him how to fly. Suppose that no airplanes of dual control are available and that it is necessary to depend entirely upon explanation for instruction, as is commonly the case when a novice learns to ride a bicycle or even to drive a car. Under those conditions the chances are good that something exceedingly unpleasant will happen to terminate the first flight. What will it be?

ALMOST any man with reasonably prompt muscular reactions and not unaccustomed to the sensation of speed should be able to drive a properly designed airplane straight across the field and get it into the air. A verbal explanation should suffice to enable a normally intelligent and cool-headed individual to fly an approximately straight course on an approximately even keel, although there will be wanderings and one wing may be held persistently low. If the novice attempts to continue his experiment very long, however, he is almost sure ultimately to pull the nose of the plane up too far during a turn and either sideslip abrutly and violently or fall into a spin,—and it would take a very exceptional individual to bring an airplane out of a spin correctly upon the basis of verbal explanation, without ever having previously experienced either that or any other violent maneuver.

If by chance the beginner got into the air safely and flew around for a short time, disaster would be almost certain when landing was attempted. The capacity to judge altitude is acquired by prolonged practice, and early trials without guidance or observation of an expert's maneuver are commonly marked by a violent contact with the ground as a result either of flying straight into it without leveling off at all or of leveling off very high and pancaking. Loss of lateral control at a high angle of attack, commonly known as "stalling," and errors in landing are the major menaces of the novice. How do they relate to the behavior of the winner of the Safe Aircraft Competition?

BEFORE answering that question specifically from experience, I venture another digression. A large proportion of all airplane accidents are attributed to "stalling." The term is used so loosely as to bring to mind Charles F. Kettering's remark of some years ago that "when you say a thing is scientific you mean you don't understand it, and when you say it is technical you mean nobody understands it." If by "stalling" is meant merely the attainment of an angle of attack beyond that of maximum lift, it does not necessarily cause any hazard and cannot in itself be productive of accident. The trouble is not with the stall itself but with the loss of control that commonly goes wih it,—loss of lateral control leading to spins, slideslips, and other unpleasant phenomena, improper balance between logitudinal control and longitudinal stability producing a violent and uncontrolled whipping downward of the nose of the plane when the angle of attack has been too sharly increased. Provide proper control at the stall, such control as there is every reason to think that it should be possible to secure, and even the classically suicidal feat of turning back into the field when the engine is cut out just after taking off loses its terrors. Provide proper control and the worst that can happen under those circumstances, assuming that the pilot attempts to control the machine at all times, will be a rather violent contact with the ground due to high sinking speed and the possible obliteration of the landing gear, especially if the area be rough or if the machine be pointed crosswind at the instant it hits.

Rebert R. Ogborn, designer (left) T. P. Wright, chief engineer of Curtiss Aeroplane & Motor Company (right) standing before the Tanager

These may sound like absurd counsels of perfection. It was quite evident during the competition that it was difficult for those with airplane experience to regard them otherwise. One of the requirements imposed by the rules was that a plane should take off from within a 500-ft. square surrounded by a barrier 30 ft. high, and that the engine should be switched off at any instant

whereupon the plane must return to land in the square and clear the barrier in doing so. That provision was commonly condemned as designed to make the Safe Aircraft Competition wind up in a general slaughter of pilots. As a matter of fact, if that requirement is too severe for any existing airplane, the truly safe airplane does not exist. Pilots will always be likely to turn back to the field in emergency, and they must be able to do so without fatal consequences.

Let me summarize again, for I cannot reiterate it too often, the qualities of a safe airplane as I rate it. It should have three virtually independent controls, with only secondary interaction between them. Moving the stick from side to side should always rotate the ship around the fore and aft axis, moving it forward and backward should always rotate it around the transverse axis, and the operation of the rudder bar should always rotate the plane around its own normal axis, to use the accepted aerodynamic nomenclature. If the use of the rudder produces rolling or the operations of the ailerons causes the plane to turn, that should be a relatively minor influence. All the controls should always be effective under every possible condition. It should be impossible by relatively gentle movement of the controls (it is fair to presume that the pilot will not jerk the machine into an abnormal attitude) to get into any unstable or uncontrollable positinn. It should never be possible to get the flying speed down below the minimum permissible value, because whatever happens the nose should go down as the speed begins to drop, preventing the angle of attack from ever increasing to appreciably beyond that of maximum lift, no matter how far back the stick may be held. It is desirable that the plane should put itself in a proper attitude with its controls released, as was in fact required by the rules of the Safe Aircraft Competition, but that is of secondary importance as compared with an absolutely assured controllability at all times, absolute simplicity and independence of the controls, and absolute insurance against dangerous loss of speed. How does all this check up with the Tanager?

The answer is that, so far as the unskilled pilot could tell (and I deliberately tried to handle the controls as clumsily as possible), the check is very close indeed.

With the stick hard back and the throttle half closed to hold the plane at a reasonable attitude with respect to the ground, the Tanager can be given some 15 deg. of rudder and skidded around the horizon without bank, the floating ailerons serving completely to check the natural tendency of the outer wing to rise, even in a fully stalled attitude. It had previously been my privilege, by the kindness of the officials of the British Air Ministry and of various manufacturing companies here and abroad, to fly some eight different types of slotted airplanes, and experience has made me a strong partisan of the slot, but never have I encountered any other machine in which aileron controls are so completely competent to overcome the natural rolling movement due to turning when stalled.

PERSISTENT TRIAL of the experiment just outlined is the best possible commentary upon spinning as a hazard. The Tanager, like other very stable and controllable airplanes, might and very possibly could be put into a spin by prolonged effort by an accomplished pilot, but the danger of unintentional spinning by the novice arises in the stalled turn. The simultaneous use of rudder, elevator, and ailerons to produce what seemed to me about the worst possible conditions likely to be encountered by a pilot flying normally and not trying to stunt showed no incipient loss of control.

An excellent flight picture showing action of slots, flaps and floating ailerons

Of course it is possible that these Utopian conditions might be destroyed by improper distribution of load or by some particular setting of the manually controllable trailing-edge flap. There have been a number of airplanes that have had very satisfactory characteristics with normal loading, and most alarming ones with an extra heavy load of baggage behind the rear cockpit. Those are things to be investigated and dangers to be guarded against, but in the plane as I flew it I could find no occasion for alarm over the consequences of "stalling." With the stick pulled hard back and the throttle closed in flying a straight course the machine sinks on an even keel,—as, to be sure, all airplanes with proper longitudinal control characteristics should. Whip stalls could doubtless be induced by abrupt movements of the stick, but the brief experience of one novice did not suggest any liability to their occurrence under anything like normal handling. While I cannot say positively that the experiment of closing the throttle and turning sharply near the ground has actually been tried, and in any case I had no part in any such trial, there was nothing in the behavior of the machine at higher levels to suggest any result more serious than a very rapid loss of altitude, with the accompaniment of some longitudinal oscillation, particularly in rough air, and consequent liability of striking the ground with the nose somewhat below the horizontal.

The Tanager has two auxiliary controls, for trailing-edge flaps and adjustable stabilizer, respectively. The flap control serves, as indicated in Professor Brown's article in this issue, to reduce the minimum speed by some 6 m.p.h., and is used only for that purpose. Its

effect on control and stability do not seem to be very marked. While the control may appear a little less active with the flap down, it remains entirely responsive. The flap gives, however, an additional member of which to think, and when a machine embodying the principles of the Tanager's design is put on the market, I hope that the flap will be interlinked either with the automatic slot or with the elevator control and so will require no conscious thought for its operation.

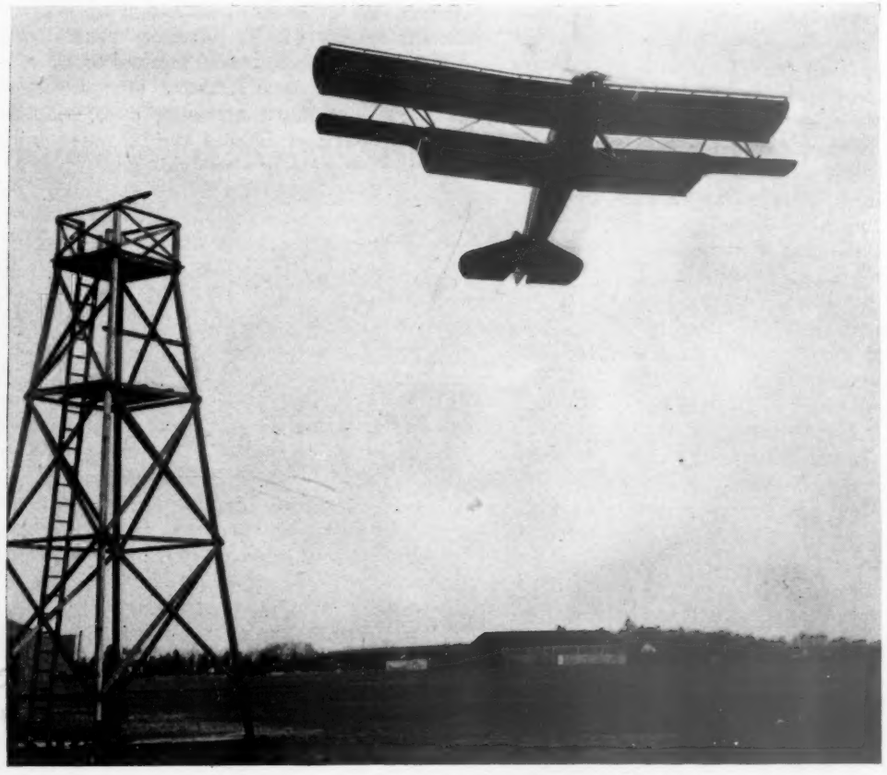
The adjustable stabilizer is like all other adjustable stabilizers. Considering it as an adjunct of a "foolproof airplane" it has too much range of action. With the stabilizer in the intermediate position, the machine flies very nicely with free controls. With the stabilizer wound all the way up, the equilibrium attitude with the controls released approximates a vertical dive. Since we take for ourselves the ideal that, if the pilot runs out of knowledge, the airplane should always get itself out of aerodynamic trouble when the controls have been released, it should be impossible rigidly to set any control to correspond to maintenance of an abnormal flight altitude. If the adjustable stabilizer is to be used at all, it would seem advisable to restrict its range to one degree or thereabouts, or just enough to compensate for normal small differences in weight distribution and for small variations in trimming speed. If the weight distribution is abnormal, flight is likely to become somewhat unsafe in any case, and in that event it is well to have the pilot constantly reminded of the fact by persistent tail-heaviness or nose-heaviness which will impel him to descend for a re-arrangement of ballast.

The problem of landing remains, and it is a twofold problem. In the first place, as everybody knows, the nicety of technique required for proper landing of an airplane is one of the greatest obstacles in the way of the would-be pilot. In the second place, if we are to reckon with the possibility of the machine settling rapidly to the ground in full stall as a consequence of trying to maintain altitude or turn with a dead engine at small elevation, an ordinary structure will face the probability of complete disintegration upon contact.

THE ANSWER to all these difficulties lies in a landing gear of immense ruggedness and in a very "soft" shock absorber system, and the Tanager has both. While I do not suggest that such technique is to be considered ideal for it in any flying, the operation of landing the Tanager can, if desired, resolve itself merely into pulling the stick all the way back and waiting for the ground to come up and hit the airplane. The exactions upon the pilot are nil, except that he must see that the first impact takes place within the boundaries of the landing field,—not a very difficult problem, as the angle of descent in the stalled attitude would be about 12 deg. in still air or about 17 deg. against a 10-mi. wind.

It took the American industry a lamentable length of time to accept the oleo gear after it had become prevalent elsewhere. It is to be hoped that designers will not have to be equally conservative in taking full advantage of a long-storke oleo's capabilities. In the Tanager, the use of a very gentle shock absorption, with the vertical deceleration of the airplane spread over a considerable distance, permits of dropping the plane into the ground at a vertical velocity which must be of the order of 16 ft. per sec. or nearly equal to the terminal velocity for which parachutes are designed without unpleasant shock to the passengers. No feature in my own flight in the Tanager was more pleasantly surprising than the lack of any sensation of violent impact as the ground met the wheels, after having come up towards them with what seemed a dizzy rapidity. That, to be sure, does not depend upon floating ailerons or flaps or slots or even upon very light wing loading. It can be realized whenever desired by appropriate landing gear design.

In writing of the qualities of the Tanager, I have considered it as an exemplification of certain aerodynamic principles and design practices, not in any sense as a commercial immediately usable type of airplane. The essential features of the design could readily be adapted elsewhere. They should not be considered as restricted to the Tanager. It should not be supposed that the results of the competition lose their practical force because the winning machine was designed solely for the purposes of the competition and is by its seating arrangement and by its other features quite unfitted for general distribution.



The Tanager in one of its climbing tests at Mitchell Field

Sales Policies AND THE *PRIVATE PLANE PROSPECT*

By
ROBERT E. LEES
Sales Manager, Waco Aircraft Company
As told to
JOHN T. NEVILL
Detroit Editor of AVIATION

The development of a profitable private plane market is a task that still remains to be satisfactorily accomplished. Small plane manufacturers are making every effort to perform the task, but the biggest obstacle . . . the belief on the part of the general public that flying is both difficult and dangerous . . . has yet to be overcome. ¶*In the accompanying article, Mr. Lees tells of the sales policies adopted by the Waco Aircraft Company, and of the success of those policies in the work of building up private plane sales.*

BACK IN 1922 at an air meet in one of our larger cities a man then in the automobile business, was looking over the few "commercial" airplanes located about the airport, and, naturally enough, asking questions relative to their purchase price, performance, usefulness, et cetera. He came upon a man representing the manufacturers of a plane that had particularly taken his eye.

"How long," he asked, "would it take me to learn to fly this machine if I should buy it?"

The man addressed stopped tinkering with his airplane just about long enough to shower the inquisitive one with a don't-bother-me glance, and replied: "It takes 2,000 hr. in the air to make a good pilot."

Somewhat hopelessly the automobile man moved on. Later, he strolled up to another airplane and decided to ask the same question of the man he found beside it. "How long would it take me to learn to fly this machine," he queried, "if I should buy it?"

"Well," the second man smiled quite warmly, "that depends upon you. If you are not cross-eyed, blind, or otherwise crippled, I can have you flying this plane by the end of the week."

During the eight years since that air meet three rather good reasons have kept the latter conversation firmly placed in my mind. One is that I was the inquisitive automobile man. A second is that the man who appeared so optimistic about my potential airmanship was C. J. Brukner, now President of Waco Aircraft Company, with which concern I am connected. And a third is that Mr. Brukner's answer to my question summed up, and still sums up, the Waco attitude toward the "knack" of flying.

I mean by that that the whole Waco sales plan is based on the fact it is easy to learn to fly. We long ago ceased to look upon the average airplane pilot as anything but a normal, level-headed man of the masses. Likewise, we have ceased to regard the airplane as some mysterious conveyance designed only for minority talent.

The World War has been credited with giving an amazing impetus to the cause of commercial aviation in this country. No doubt it did, partacularly to technical development. But just now, commercial airplane dealers, whether they realize it or not, are experiencing sales resistance born of "heroism" and "dare-deviltry," and instilled in the public mind during and subsequent to that War. Let's be honest with ourselves, and with the public to whom we are trying to sell our planes. There is nothing difficult about this business of learning to fly. A man is not a hero just because he holds a transport pilot's license.

WE OF THE INDUSTRY are responsible for a lot of the public's unfavorable attitude toward flying, and when I say unfavorable attitude I mean an attitude not conducive to enlarging the private owner market. Unfortunately, most airplane dealers, in order to exist, have found it necessary to combine their dealerships with an aerial taxi service, "joy-hopping" service, or some such business allied with the industry. That means that the dealer has had to sell the public on his own "dare-deviltry" and his own "local heroism." He has had to convince them that it costs a lot to operate an airplane in order to collect the seemingly abnormal price he asks for his

rides. He also has to convince them that he is assuming a considerable personal risk when he goes up with them to teach them to fly in order to collect what he terms a reasonable sum for instruction. Meanwhile, unconsciously or not, his prices leave the impression that the ability to pilot an airplane is something acquired only after years of study and training, like the skill of a doctor, or brilliance of a lawyer.

On the other hand the dealer's chief interest is selling airplanes, an occupation in which he must reverse his arguments in favor of economy of operation, simplicity of handling and safety. That automatically puts our dealer on the opposite side of the fence. In other words, he is assuming to be on both sides of the fence at the same time, an assumption that puts him in a rather ridiculous light in the eyes of the shrewd prospective airplane purchaser. How many automobile salesmen will admit the difficulty of driving an automobile in heavy traffic? How many automobile dealers have the audacity to charge the auto-buying public for instruction in operating the auto-buying public's own equipment?

We are encouraging our dealers to minimize the supposed difficulty of learning to fly; to tell the truth about the easiness of learning to fly. We are encouraging them to adopt selling methods much like those of automobile dealers. An automobile salesman never loses an opportunity to give a prospective purchaser a ride in his car, and a *free* ride at that. He goes out of his way to carry people places; to give his car a chance to be of some service to persons who may, or may not, be "in the market" for an automobile. The auto salesman's theory

Action photo of a Waco Ten powered with a Wright Whirlwind F-5 engine

is that those persons who are not "in the market," will be some day, and when that time comes they will have ridden in his car, will have known its comfort, its performance and its ease of handling, and he will have a decided advantage over his competitors.

Let's have a sane and honest view as to the skill required in flying, and let's not over-regulate the flying business. Twenty-five years ago automobile manufacturers submitted to the horse-and-buggy traveling public the proposition of discarding a "safe and sane" 3 or 4 mile-an-hour mode of travel in favor of a mode averaging 10 or 12 miles an hour. The ratio of speed increase was 3 to 1 and it took several years for the auto

A Wright F-5 Waco Taper Wing owned by Mid-West Airways Corp.

industry to "sell" the general public on the idea that the increased speed was not nearly so hazardous as some of the least conservative minds pictured it. Those pioneer auto dealers, too, had to obliterate the popular impression that driving a motor car was difficult, as well as being dangerous, and that its accomplishment was limited to the most dexterous and daring of persons.

To day we find the average speed of automobiles has increased from 10 or 12 m.p.h. to 40 or 45 m.p.h., and millions of them are being driven about our highways and our streets. Nearly every adult person in the United States either has one, or has had one, and drives himself. Today, we aircraft manufacturers are attempting to sell the idea of aircraft, not to replace the automobile in its entirety, but to supplant all modes of surface travel in the particular type of service for which the airplane is preeminently fitted. Our ratio of speed increase again is approximately 3 to 1, over the railroad a little better than 2 to 1, and over the fastest kind of steamer travel, nearly 4 to 1. Just as the early auto dealers were concerned with blotting out the bugaboos of driving automobiles, we are confronted with the problem of convincing the general public that it is not difficult to fly an airplane; that airplane pilots are not superhuman or abnormal in any respect, and that the average adult person can learn to fly as well as he or she learned to drive an automobile.

Our policy in Troy is to encourage our dealers to develop sales to private individuals. That is the market which we believe, means the largest production, the quickest turnover, and the most satisfying profits. And that is the market that must be developed in its fullest sense, if the aircraft manufacturing industry is ever to amount to the proverbial Tinker's Dam. We are persuading our dealers to attempt to efface from the public mind the thought that flying, or even stunting, is heroic or daring. We are asking them to preach simplicity and safety and utility, instead.

OUR SALES, all along, have been showing a tendency toward the private owner. Four years ago we were selling about 10 per cent of our output to individual owners. Today about half of our production goes to that class of purchaser. That is a hopeful sign that

distributors are reversing their attitude toward the public in order to attract the private owner. We believe the best way to attract this market is through private flying clubs. That, incidentally, is the most inexpensive means of getting flying instruction. For instance: One club with which I am familiar, has 40 members, and has worked out a system whereby each member can learn to fly well enough to acquire a limited Commercial Pilot's license at an average cost of about $6.50 per hour.

Waco, from the beginning, has had a policy of selling through distributors and dealers, and protecting them religiously. Of all the planes we sold in 1929 not one was sold at retail by the factory on which the distributor got no discount. Our entire sales policy might be termed one of "low-pressure" selling. During this past Fall we did not flood our distributors and dealers with airplanes. The result is that, today, there is no stock of new planes in storage at Troy, and the supply of new planes in the hands of our dealers is very much lower than it was this time last year. We consistently help our dealers to sell, but with no hard-boiled, high-pressure salesmanship. We keep accurate records of our dealers' stocks on hand at all times and do everything possible to prevent them from getting into an uncomfortable position.

Waco has a recommended finance plan, which has worked out very nicely, but we strongly advise our dealers against long trading on used airplanes. And we keep records of our dealers' stocks of used planes chiefly to remind them of the capital they have tied up in used planes. Our planes ordinarily have a used value which has been quite high in comparison with other used commodities, and our records indicate that the handling of used planes is not the problem it is in the automobile industry. Ultimately, no doubt, that is a problem that will have to be faced in selling airplanes retail to the general public.

Just now Waco has approximately 35 distributors and nearly 300 dealers, and our first interest is to see that these representatives make money. Our factory has been a prime mover in increasing discounts, having done so before being requested to do so by the distributors. We realize fully that modern sales methods are expensive and the distributor is entitled to a fair profit. However, we have always maintained a high standard of requirements as to selection of our distributors, these requirements being more inclined toward severity than is generally the case. In fact, we have territory now open that could be closed if our policy was otherwise.

Reverting again to private owners let me say that we believe that the development of a sizeable market among individual owners will be governed by growth of servicing facilities over the country. Just as Aviation has pointed out editorially, the private plane owner is going to demand this service. If such facilities are nonexistent he will not be a satisfied owner. For that reason we encourage our distributors to carry Waco parts in stock, and, incidentally, our distributors have found that the parts and repair business pays its own way. Some day, and let's hope it is not far off, the service and parts end of a distributors business will be a real profit-maker.

As to advertising: Our policy has been to put value into our planes in order to reduce the cost of selling by advertising. Much of the advertising in this industry, we believe, is by word of mouth, so for that reason our advertising and sales expense has been low. Just now we are conducting a survey to determine what magazines, outside of the trade-journals, can be used advantageously in advertising our product.

We are quite interested in the export market and have made considerable progress along that line. An inquiry from a foreign country gets the same attention in our plant as the domestic inquiries do. We now have distributors in China, Mexico, San Salvador, Brazil, Argentina, and Australia. Our exports during 1929 had a value of approximately $250,000. Although our production in 1929 had a value in excess of the value of our 1928 production we produced fewer planes, the excess being due to more sales of our higher powered planes.

Four of the Waco Taper Wings sold to the Federal Mexican government for pursuit work.

GENERAL NEWS

HERBERT F. POWELL, *News Editor*

Aero Branch Appropriation Set at $9,204,830 for 1931

Increase Over '30 Fund is $2,788,210

WASHINGTON (D. C.)—For the fiscal year 1931, an increase in the Aeronautics Branch appropriation of $2,788,210 over the 1930 budget has been reported by the House Committee on Appropriations. This amount calls for appropriation of $1,260,830 for "Aircraft in Commerce" and $7,944,000 for "Air Navigation Facilities" a total of $9,204,830.

Aside from funds for administration and for carrying out the regulations of the Air Commerce Act, the former classification embraces provision for additional inspectors, five new airplanes, and a limited number of aeronautical engineers, topographic draftsmen, and personnel for assignment to aircraft engine testing.

The 1931 appropriation reported thus constitutes an increase of $279,000 over the estimated fund of $8,925,830. The appropriation for 1930, it will be recalled, was $6,416,620.

Provides for Southern Lighting

Included in the amount for "Air Navigation Facilities" are funds for lighting of the following airways: Columbus-Philadelphia, 413 mi.; Jacksonville-Richmond, 550 mi.; San Diego-Fort Worth, 1,206 mi.; and Fort Worth-Louisville, 805 mi. This cares for nearly 3,000 mi. for the four routes. Furthermore, an additional $250,000 was added by the Committee on Appropriations to the original estimate to provide for a beginning of lighting construction on the Fort Worth-Birmingham route of 615 mi. and the San Antonio-Midland run of 285 mi. This amount will carry these projects along until next year, at which time additional funds can be made available for their completion. The southern transcontinental route planned, then, will be well under way with the construction projected in the fiscal year of '31 through such important lighting projects as those connecting Forth Worth with San Diego to the west, Louisville to the north, and Birmingham to the east. [See Airports and Airlines section for story on "Air Navigation Facilities" appropriation.]

Under "Aircraft in Commerce," the amount listed for "purchase and replacement, including exchange, of airplanes" is put at "not to exceed $95,000." Supplementary to this is the phrase of the bill caring for purchase of engines, plane and engine accessories, spare parts, and maintenance, operation, and repair of planes and engines.

In a hearing in December, Major Young pointed out to the Committee that the Aeronautics Branch at present had twenty planes, nine of which were in poor condition and would need replacement. Two others were stated to be out of operation because of damage which had not as yet been repaired. Among the eight types employed by the Branch are products of Stearman, Buhl, Travel Air, Laird, and Boeing.

For the inspection service, the Branch asked seventeen additional aeronautical inspectors and seven factory inspectors. The Branch, Major Young stated, already has named these men with the exception of two of the aeronautical inspectors, the deficiency fund having cared for the rest.

Major Young told the Committee that the Branch would be obliged to return for a deficiency amount of about $252,000 for 1930. Apparently, too, a deficiency fund will be needed in 1931; for the Major has estimated a total of $1,431,830 would be needed to wholly obviate the need for such a fund in '31. Since the appropriation for 1931 is $1,260,830, approximately $171,000 is lacking to clear up this matter.

It may be pointed out here that in a letter to Hon. Milton W. Shreve, of the Appropriations Committee, sent following this particular hearing, Major Young suggested an increase in the budget for Aircraft in Commerce, then estimated at $1,231,830, to $1,529,330. According to the plan suggested in this communication, fifteen additional airplanes were asked, which would allow the subtraction of fifteen inspectors not needed if the additional planes were granted. This plan was not acted upon, although the appropriation reported was raised to care for purchase of five rather than three planes.

The appropriation of $1,260,830 is an increase of $29,000 over the budget estimates and an increase of $302,830 over the amount originally appropriated for the fiscal year 1930. The following table will serve to show the distribution of this money under the several divisions:

Fiscal year	1930	1931	Increase
Administration.....	$83,670	$85,700	$2,030
Inspection service...	581,590	814,380	232,790
Regulation, licensing.	141,910	175,370	33,460
Airports, aero information.....	$57,830	68,180	10,350
Airway mapping (Coast and Geodetic Survey).....	28,000	35,600	7,600
Research (Bureau of Standards).....	65,000	81,600	16,600
Totals.....	$958,000	$1,260,830	$302,830

The increases noted in the table above are accounted for as follows: Administration, additional employees at Washington office; Inspection service, salaries and traveling expenses of various inspectors, with an additional $30,000 for two more planes, bringing the total additional craft to five rather than three; Regulation and licensing division, for additional clerical help and for a limited number of engineers for stress analyses checking; Airports and aeronautic information division, salaries of additional employees; Airway mapping section, additional funds to permit employment of two more topographic draftsmen and to provide more money for strip map printing; and aeronautical research division, additional personnel for engine testing.

Rum Refueling Is the Latest Idea

CHICAGO (ILL.)—Word received here tells of rum smuggling planes which exchange cargoes in mid-air by the refueling method. It is said some men fishing in an isolated lake in the Minnesota woods discovered this latest tactic of the rum runners when they were spattered with drops of the liquid and found it didn't taste anything like gasoline. According to reports, the American planes are equipped with extra 100-gal. tanks into which the Canadian fliers empty the liquor —just like so much fuel.

Chance Vought Sales Were $3,138,000 in '29

HARTFORD (CONN.)—Net airplane sales of the Chance Vought Corp., a U. A. & T. unit, amounted to $3,138,000 for 1929, a company report states. This exceeds by almost ten per cent the 1928 record.

Current unfilled orders call for $1,500,000 worth of craft, one of the largest orders of which is a U. S. Navy contract for O3U-1 type Vought Corsair amphibions, designed especially for use on board plane carriers and other ships of the Navy.

Approximately a million dollars export business was done by the Chance Vought Corp. during the past year compared with shipments valued at about $200,000 in 1928.

Arctic Patrol Flight Ends at Selfridge Field

SELFRIDGE FIELD (MICH.)—After a round trip flight to Spokane, fifteen of the eighteen pursuit planes composing the Army's "Arctic Patrol" were once more in their hangars here. The trip, which started Jan. 10, had been made to test the efficiency of planes, personnel, and equipment under severe winter conditions. Of the three missing planes, one arrived after an hour's delay, a second was forced down on the last leg of the journey, with a broken connecting rod, and the third had been thoroughly damaged some days before at Beach, N. D.

As common throughout the entire trip, the three transports lagged behind and made Selfridge after dark.

According to Major Royce, who commanded the flight, the trip was a success in showing the behavior of present

Tech. Sergt. Kennard Wilson at the radio set aboard the Ford transport flown with the Arctic Patrol.

equipment in arctic weather. This behavior, however, was anything but good. The skis and the engine heaters have been the main sources of trouble. Temperatures on the flight were between 30 and 75 below zero.

St. Louis Firm Asks 100 Kinners

LOS ANGELES (CALIF.) — Kinner Airplane and Motor Corp. has received a contract to supply the St. Louis Aircraft Corp. with 100 Kinner K-5 engines during 1930, these engines to be installed in the new model Super-Cardinal sport plane produced by the St. Louis company.

Defender Will Fly to Bahamas

MIAMI (FLA.)—Plans for a flight from this city to the Bahama Islands and Havana, Cuba, by the Goodyear blimp "Defender," have been completed. The flight will be made within two or three weeks, according to Goodyear officials.

Travel Air "S" for Shell Firm

WICHITA (KAN.)—Travel Air Manufacturing Co. is now building one of its fast model "S" low-wing monoplanes for the use of Lieut. James H. Doolittle, head of the aviation department of the Shell Petroleum Corp. According to U. deB. Daly, president of the Shell firm, it will be used exclusively by Lieutenant Doolittle in expanding the company's aviation activities. The plane is to cost approximately $17,500 and will be delivered in about a month.

St. Louis Show Takes Shape; Little Space Left

ST. LOUIS (MO.)—With little space in the Arena remaining for last minute exhibitors, the International Aircraft Exposition is rapidly taking form. All but a few booths have been taken.

As a part of the exposition a transportation exhibition has been arranged. This is to be complete in detail, animals being used from circuses to give a realistic touch. The Smithsonian Institute and many private individuals have loaned their resources to aid the show officials. The Curtiss "Tanager" will be used depicting the furthest advance of the aeronautical industry.

The exhibit will lay emphasis upon the development of aviation, tracing its growth from the time of Archytas and other early experimenters who hoped to conceive a flying machine. The display is being held in conjunction with a pageant that will close the Exposition each evening.

With the Bellanca "Columbia", in which Clarence Chamberlin spanned the Atlantic, as the central figure, one section of the historical exhibit will deal with all of the outstanding flights of the past 12 yr. Photographs of these flights, models of the planes, and photographs and paintings of the fliers participating, will be shown. In addition it is planned to have one pilot, who has crossed the ocean by plane, present at this display each day of the Exposition.

Men who have led in America's development of the aircraft industry are expected to be present at the dinner which the Industrial Club of St. Louis will give at Hotel Chase Feb. 20 in honor of aeronautical figures who are in St. Louis for the Exposition. Several of them will address the gathering. Maj. Albert Bond Lambert, dean of aviation enthusiasts in St. Louis, will be toastmaster.

Form New Orleans Air Bureau

NEW ORLEANS (LA.)—At a recent organization meeting of the aeronautics bureau of the New Orleans Association of Commerce, Thomas H. Taylor was elected chairman, and James I. Smith, vice-chairman. Robert R. Osborn, project engineer of the Curtiss "Tanager" which won the Guggenheim Safe Aircraft Contest, attended and was made honorary adviser.

HIGH POINTS in the NEWS

▶ *More—and needed!* House Committee on Appropriations reports Aeronautics Branch fund of $9,204,830 for the fiscal year 1931—$1,260,830 for "Aircraft in Commerce," $7,944,000 for "Air Navigation Facilities." This is an increase of $2,788,210 over the appropriation for '30 and an increase of $279,000 over the budget estimate.

▶ *To tell, or not to tell?* Senators Bingham and Bratton press demand for publication of full details on aircraft mishaps; Clarence M. Young states belief that safety will best be promoted by new regulations now being drafted "rather than by legislation which requires action by Congress to meet conditions as they arise."

▶ *But.* New bill offered by Senator Bingham requiring the Secretary of Commerce to make causes of air accidents public is said to be acceptable to the Department of Commerce. This measure would not necessitate the Secretary to fix responsibility of crashes; furthermore, it would protect the Department from civil liability.

▶ *Four years added.* Alteration in licensing system provides that original pilot license need only be renewed every five years. Six month renewals will be handled by inspectors at field under new ruling, which is designed to expedite service.

Airports and Airlines

▶ *Mail measure offered.* Postmaster General Brown presents bill to House committee designed to extend his authority in administration of the air mail. Understood to embody ideas stated in his speech at Cleveland on sliding rate scales, the new regulation would authorize extensions and consolidations of routes as they are necessitated.

▶ *New base, new officers.* T.A.T. headquarters moved to Los Angeles; several officials resign.

▶ *Comprehensive code.* Such is being worked out by Aero Branch officials and transport operators. Greater safety promised through further utilization of radio; operations over unapproved airways to be curbed.

Foreign

▶ *Schneider changes.* British proposals for modification approved by F.A.I. subject to ratification in June. They are: that navigability trials and actual races be held the same day because of rarity of suitable weather for two consecutive days; that the fee shall be raised, with entries to be accompanied by about £8,000 ($38,880), in order to further guarantee that nation will compete; and that contest must be held between June 1 and Sept. 30.

Bingham, Bratton Again Ask Full Reports on Accidents; Young Defends Methods Followed by the Aero Branch

Belief Advanced That Air Act Gives Publishing Power

WASHINGTON (D. C.)—With sentiment in the Senate in regard to the publication of air accident reports again aroused as the result of the recent crash on the West Coast, Senator Bingham, of Connecticut, on behalf of the National Aeronautic Association, has issued a statement again claiming a need for making accident reports fully public. In his statement, Senator Bingham expressed the opinion that the situation can be met if his bill is passed, empowering the Department of Commerce to subpoena witnesses to accidents and freeing the Department from any legal responsibility in publishing the reports. Senator Bingham believes, with the exception of the proposals mentioned in his bill, that the Air Commerce Act makes provision for all of the regulation necessary. He is convinced that the publication of reports on aircraft accidents by a responsible government department will be more desirable than the present system "of allowing the public to get its information by rumors and irresponsible statements." He feels certain that the Department of Commerce will withdraw its objections to making public accident reports when it is given the additional powers contained in his bill.

Senator Bingham

Asks I. C. C. Control

Other legislation designed to make available to the public official reports on aircraft accidents, is being pressed by Senator Bratton, of New Mexico. Senator Bratton, however, desires to go further in this connection than does Senator Bingham. Under the terms of the Bratton bill, the transfer of all interstate air regulation from the Department of Commerce to the Interstate Commerce Commission, is authorized. The Department of Commerce is better suited to aid the industry along technical lines than it is to administer operations in the interest of the public, believes Senator Bratton.

In commenting on the situation, Senator Bratton said that the recent crash in California has served to emphasize the need for more adequate regulation. The Department of Commerce has sufficient power at the present time to make public the findings of its experts on accidents if it desired to do so, he claims. The aviation industry would find it more to its interest to get behind a program calling for interstate regulation than by opposing it, said the senator. In this connection, he called attention to the fact that he already has received endorsements from many air transport companies commending the provisions of his bill for giving the Interstate Commerce Commission control over all air traffic that is more than intrastate.

Senator Bratton believed that in addition to making available to the public complete information as to the causes of individual crashes, the government should provide, through the Interstate Commerce Commission, for a set of regulations governing the rates, schedules, and other operating details of the air transport companies. While not certain as to the legal points involved, he thinks that it would be desirable to permit the government to supervise the operation of all airports that are used by interstate air traffic. No matter how completely regulation of planes and pilots is undertaken, it will be to no avail if airports are used which make accidents inevitable, he said.

The bill introduced by Senator Bratton has been submitted to the Interstate Commerce Committee while the one introduced by Senator Bingham has been referred to the Commerce Committee. Neither committee has taken action on the bills but in both instances the West Coast accident has been used as a reason for urging immediate consideration. As the Interstate Commerce Commission is at present tied up with the complicated matter of regulating the interstate transmission of intelligence by wire and wireless, it is

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New Remedy Sought

AS we go to press, a bill has been introduced by Senator Bingham which would require the Secretary of Commerce to make public the cause of any aircraft accident resulting in serious injury or loss of life, but it does not instruct him to fix the responsibility thereof as was the case in the former bill. The measure would be an amendment to the Air Commerce Act, granting authority whereby the Department could require the attendance of witnesses. Furthermore, the Department would be exempted from any civil liability in publishing the causes of the accident. This new bill was introduced by Senator Bingham following consultation with Maj. Clarence M. Young and it is understood that the draft is acceptable to the Department of Commerce.

New Rules Being Drafted Promote Safety, Says Major

WASHINGTON (D. C.)—No provision was made in the Air Commerce Act of 1926 for the Aeronautics Branch to conduct formal hearings, subpoena witnesses, take testimony under oath, or engage in any other practices necessary to bring out the pertinent facts underlying accidents in civil aviation which could be made public as soon after the accident as possible. . . . Thus did Maj. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, assert the position of his department in a statement outlining the procedure followed by the Branch during the past three years in compiling and publishing the causes of aircraft accidents. "With the authority and machinery we have available," Major Young said, "we determine the facts about aircraft accidents from voluntary and visible sources in the most thorough manner permitted by the circumstances. The investigations are conducted informally. That is, no dates are fixed for formal hearings and no witnesses are subpoenaed to attend. Rather, an attempt is made to obtain information from all available sources, give it application from the practical point of view for the purpose of ascertaining as nearly as possible the probable causes, and then take such action to remove it from future operations as is indicated thereby. The authority now granted by the Air Commerce Act is considered sufficient for this undertaking.

Clarence M. Young

Would Need Liability Protection

"Every six months the Aeronautics Branch of the Department of Commerce makes public complete statistics on civil aircraft accidents for the previous period and from these statistics not only the Department of Commerce but the aeronautical industry and the general public can see what corrective steps should be taken.

"I believe that if the authority now granted under the Air Commerce Act for the investigation of aircraft accidents were augmented by a provision precluding the admission of official accident reports as evidence in civil suits and authorizing formal investigations of aircraft accidents if and when preliminary informal investigations of a given accident made such a hearing necessary or advisable, much of the alleged mystery as to why aircraft accidents occur

would be removed. However, as this procedure cannot be followed under the authority and facilities now available, we must turn to the next best method, which, after all, enables everyone concerned with the development of aeronautics to proceed along the course leading to unquestioned safety.

"The recent report of the Aeronautics Branch covering the first six months of 1929 showed, among other details, that 59.04 per cent of all aircraft accidents in that period was caused by personnel; 18.08 per cent was due to engine and engine accessory failures; 8.80 per cent to airplane structural failures; 9.35 per cent to miscellaneous causes, including weather, darkness and airport terrain; and 4.73 per cent was credited to undetermined and doubtful causes.

Department Takes Corrective Steps

"From these figures, it is apparent to everyone that there is very little mystery as to the causes of aircraft accidents occurring in the first six months of 1929. Furthermore, these figures enable the government, the flying schools, aircraft operating companies, the pilots and mechanics, the engineers and manufacturers, to take corrective steps. The part the Department can play includes changing the qualification requirements for certain groups of pilots, modification in design and construction of aircraft and engine standards and changes in air navigation facilities. This has been and still is one of the major objectives of the Aeronautics Branch.

"In the absence of the necessary authority and machinery to conduct and make public as soon thereafter as possible, the cause of each aircraft accident, we attempt, through our inspectors in the field, to reconstruct the accident to the fullest extent possible, taking into consideration the locality, weather, pilot's experience and rating, nature of accident, kind of aircraft and its status, maneuvers immediately preceding the accident, and such other relevant information as is available.

Reviews Investigation Process

"This is accomplished as soon after the accident as a representative of the Department can reach the scene. His report is transmitted to Washington where it is reviewed by an Accident Board composed of a Medical Director, Aeronautical Engineer, two expert pilots, a statistician and a lawyer, who attempt to account for all contributing factors and reflect a composite view with respect thereto. The inspector's report naturally includes an opinion from the inspector who is thoroughly familiar with the subject of aeronautics and whose opinion therefore may be regarded as expert. Voluntary statements from other pilots and witnesses who have made them with the knowledge that they are to be used only by the Department in determining the cause in order that suitable remedies may be applied in the future, also are transmitted.

"The investigations thus conducted do not in any way contemplate the determination of any legal responsibilities which may be involved. Therefore, in all probability the same course is not followed nor the same ground covered as would be the case if such a motive dominated in the premises. This seems to readily suggest, then, that injustices to individuals could very easily result were the information, thus developed in individual cases, released for consideration in the light of legal technicalities, contributory negligence phases, and proximate and remote causes, rather than for the practical deductions of thoroughly experienced aviation personnel for the purpose of applying remedial measures in future operations.

Tells of New Regulations

"The foregoing relates only to the information involved in the immediate causes of accidents. It does not include other extremely pertinent facts, such as the license status of the pilot and aircraft, whether the aircraft or pilot were operating in conformity with the privileges and restrictions of the Air Commerce Regulations, or whether penalties for violation in the particular case were in order. Such information is ascertained by the Department in the case of each accident."

Said Major Young in a later statement following a conference with representatives of the principal air transport operators:

The aims of the Department in promoting the safety of air transport operations can best be gained, experience has shown, through the promulgation of suitable regulations, which, through their flexibility, may readily be kept abreast with the rapid progress of aeronautics, rather than by legislation which requires action by Congress to meet conditions as they arise. These new regulations will be effected as soon as conditions permit, continued the Assistant Secretary. The new requirements, it was pointed out, are being prepared with the co-operation of the transport organizations.

Under the Art, it was asserted, two fundamental requirements to insure maximum safety and reliability have been established: first, airworthy craft and competent airmen; and second, development of airways equipped with lighting facilities, weather reporting systems, radio communication, and radio beacon avigation aids.

Third Requirement Added

To these two requirements there now is added a third which requires a full utilization of air navigation facilities and specifies that all aircraft engaged in the transportation of passengers for hire on scheduled interstate service shall be operated over fixed routes provided with these aids to air navigation and that the aircraft engaged in such operations shall be equipped to take full advantage of these aids.

The move, then, continues to advance and make widespread the use of two-way radio facilities, well-equipped routes with full services, and efficient night flying aids. The Department's efforts, the statement continues, is without end in this respect. As fast as authorization and funds are available, new projects of this nature are undertaken by the Branch.

In the interests of safety, the transport organization itself must, if possible, provide these facilities in instances where the government has as yet been unable to provide them.

Ask Accident Reports

(*Concluded from page 258*)

not believed that hearings can be devoted to the Bratton bill for some time to come. Senator Johnson, of California, who is chairman of the Commerce Committee, however, has indicated that he will give prompt consideration to Senator Bingham's draft.

One of the latest phases in the discussion on aircraft accidents, and what should or should not be published concerning them, occurred when Senator Bratton discounted Clarence M. Young's statement that the Commerce Department lacks the power to make its findings public. On the contrary, the Senator from New Mexico declares the Air Commerce Act makes the announcement of air crash data imperative. Said Senator Bratton:

"The Department originally construed the act as compelling it to make public its findings and did so in a number of cases, but when that action evoked a storm of protest from operators and pilots, the Department changed its attitude, discontinued complying with the law and began the practice of making semi-annual or annual reports in which accidents were set out in classes or categories."

"In other words," suggested Senator McKellar (Dem.), of Tenn., "when owners protested, the Department simply disregarded the law absolutely and undertook to repeal it and did repeal it."

Bratton Refutes Bingham's Statement

When Mr. Bratton replied affirmatively, Senator McKellar pointed out that the Department had experienced no difficulty in making the desired reports when so directed by a Senate resolution.

Reference was then made by Mr. Bratton to a statement of Senator Bingham's which in effect declared that federal regulation of railroads had grown out of land grants made to the companies. Such is not the case, affirms Senator Bratton, the federal power over railroads emanating from the commerce clause in the Constitution.

In continuing the discussion, the New Mexico Senator admitted that while the Department of Commerce had accident publicity in its power, it lacked some facilities for gathering data on air mishaps, such as the power to compel witnesses to attend the investigations, and demanding other persons to produce books and records, pertinent to the case.

Mr. Bratton and Senator McKellar have secured passage in the Senate of a resolution directing the Department of Commerce to issue accident reports to the states in which the crashes occur.

Bendix Earnings Up; Aquisitions Projected

CHICAGO (ILL.)—Bendix Aviation Corp. earned more than $8,000,000 in 1929, according to preliminary estimates. The actual profit reported for the predecessor and constituent companies in 1928 was $6,166,045.

Eclipse Manufacturing Co. and Bendix Brake Co. are said to account for more than 75 per cent of the net income of Bendix Aviation Corp. The brake division is reported to be operating at the highest rate in the history of the company, while the aviation supply subsidiaries of the corporation are operating at about the same rate as a year ago.

Bendix Aviation Corp. further reports that there are 2,115,000 shares of its capital stock outstanding, that it has cash to the amount of $20,000,000, and that inventories of both raw and finished stocks are low. Negotiations are complete for the acquisition of additional properties by the corporation, it has been announced by W. J. Buettner, treasurer.

To Hold Meeting Of Aero Teachers

Chamber Body Will Foster Event in St. Louis, Feb. 17-19

NEW YORK (N. Y.)—The Educational Committee of the Aeronautical Chamber of Commerce has laid plans for a national conference on aeronautical education to take place at St. Louis, Feb. 17-19, during the International Aircraft Show. This will give visiting delegates a chance to view the latest developments in aviation.

There are 61 universities and colleges widely scattered throughout the United States offering courses in aeronautics, and these institutions have reported an enrollment of 2,406 students in aviation courses in a recent survey of the Aeronautical Chamber of Commerce. There are also 21 elementary school systems, 93 junior high schools, 130 senior high schools, seventeen evening schools, seven continuation schools, three trade schools, and one vocational high school offering aeronautical training of some kind to tens of thousands of students interested in the industry. During 1929 there was a ten-fold increase in the number of secondary schools offering courses in aeronautics.

Four Speakers Scheduled

Prof. Roland H. Spaulding, of New York University, chairman of the Educational Committee of the Aeronautical Chamber of Commerce, will be chairman of the conference. The Daniel Guggenheim Fund Committee on Secondary and Elementary Aeronautical Education is co-operating with the Chamber in calling the conference.

Four speakers, prominently identified with the development of aeronautical education in the United States, will lay the groundwork for the three-day conference in their addresses at the afternoon session, following the first day luncheon.

Dr. John W. Withers, chairman of the Daniel Guggenheim Fund Committee on Elementary and Secondary Aeronautical Education and Dean of the School of Education, New York University, will talk on "Aeronautical Education in the Public Schools of the United States."

Delegates to Meet in Groups

Progress made in colleges and universities will be outlined for the delegates by Prof. Earl W. Hill, University of Southern California, chairman of California State Advisory Committee on Aeronautical Education. "Aviation Ground School Education" is the subject of a talk to be given by Andrew D. Althouse, head of the Automotive and Aero Departments, Cass Technical School, Detroit, Mich.

J. S. Marriott, Chief of the Inspection Service, Department of Commerce, will talk on "Aeronautical Education from the Standpoint of the United States Department of Commerce."

Delegates to the conference will meet in three separate groups classified according to their interests, for the second day session. One group will consider the problems of aeronautical education in public schools; a second, aeronautical engineering and aviation economics for universities and colleges; and the third, aviation ground school education. The committee sessions will continue through the morning of Feb. 19, with all delegates attending the conference meeting in general session to listen to the completed committee reports and recommendations at the afternoon session that day.

Chairmen selected for the various committees have beeen announced by Professor Spaulding. They are: Committee on Aeronautical Education in Public Schools, B. G. Shackelford, assistant superintendent of schools, St. Louis; Committee on College and University Aeronautical Education, Bradley Jones, head of the department of aeronautics, University of Cincinnati; Committee on Aviation Ground School Education, W. Harold Taylor, head of Buffalo University Ground School.

Speakers at the committee meetings will include Charles S. ("Casey") Jones, president, Curtiss-Wright Flying Service; Edward P. Warner, editor, AVIATION and former Assistant Secretary of the Navy for Aeronautics; Willis B. Haviland, director of schools, Universal Aviation Corp.; and H. F. Lusk, dean, Boeing School of Aeronautics.

A joint banquet of the Aeronautical Chamber of Commerce and Society of Automotive Engineers on Feb. 19 will close the conference.

Canadian Clubs Active in 1929

OTTAWA (CAN.)—Calgary led the provinces in 1929 in number of club members with a total of 1,060, Saskatoon was second with 745, and Regina third with 357. There are now 23 flying clubs in operation in contrast with fifteen during 1928, and flying hours last year amounted to 15,400 as against 8,124 in the previous year. In 1929, there were 396 solo fliers, while Winnipeg led the clubs in flying time with a total of 1,458 hr. Some 47 airplanes were on loan to the clubs at the end of last year while an additional thirteen were owned by the various groups.

Air Branch Now Has 775 Medical Inspectors

WASHINGTON (D. C.)—Figures released by the Department of Commerce show there are now nearly 775 medical examiners on duty throughout the United States. Their work consists in examining pilots and student pilots as to their physical and mental fitness for flying before they are licensed, and also in checking those who have received their licenses by periodical examinations.

A rapid increase in the number of examinations conducted by these medical officials is noted, 11,688 having been examined during 1927-28, while 28,153 were examined during 1928-29. It is the belief of Dr. L. H. Bauer, Chief of the Medical Section of the Aeronautics Branch, that the fiscal year 1929-30 will show some 50,000 of these examinations conducted.

The fees for these examinations have been fixed as follows: Transport, Limited Commercial and Industrial pilots, $15; original examinations of Private and Student pilots, $10; all re-examinations of whatever class, $10; and the mid-year checks of Transport and Limited Commercial pilots, $5. These fees are payable to the medical examiners who conduct the examinations.

Aeronautics Branch Alters License System

WASHINGTON (D. C.)—Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, has announced a new plan for the issuing and renewing of pilots' licenses in order to speed up that operation of the branch.

After the original license has been issued, the Aeronautics Branch will only renew it once every five years. The six-month renewals will be handled by the Department inspectors in the field.

"A new type license recently has been issued which embodies space for six-month renewals for the life of the license," Mr. Young said. "Therefore, holders of pilot licenses who desire renewal will hereafter apply direct to the nearest Department of Commerce district office or aeronautical inspector and not to Washington. This procedure eliminates the former delay in transmitting the license to and from the Washington office."

Detailed instructions for renewal of license will be mailed to all license holders 30 days prior to the license expiration date.

Other Points of Change

WASHINGTON (D. C.)—Modified requirements for pilot licenses announced recently by the Aeronautics Branch provide that applicants need not repass examinations on any subject they have passed in the preceding seven months. In no case, however, is flight test to be waived on re-examination or on examination for a higher grade.

Furthermore, an entire new application must be filed in each case, showing that the applicant has the necessary time for the grade of license for which he is applying, and this new application must be accompanied by a medical certificate showing that he has passed a physical examination during the past four months for Transport and Limited Commercial licenses. New photographs are also required.

Applicants presenting applications direct to an inspector and claiming to have successfully accomplished portions of previous examinations within the preceding seven months, will be required to obtain telegraphic verification, at their own expense, from the district or Washington office of the Aeronautics Branch, before application can be accepted.

Richfield Gets Fuel Contracts

LOS ANGELES (CALIF.)—Mid-Continent Air Express has signed a 5-yr. contract with the Richfield Oil Co. for all aviation gasoline and lubricating oils to be used by the firm, according to C. M. Fuller, president of the Richfield company. Additional contracts recently signed, according to Mr. Fuller, included one with the West Coast Air Transport Corp., and one to supply the U. S. Army at Crissy Field, San Francisco, and Tucson, Ariz., until June 30, 1930.

Atkinson Talks on Aero Union; Senators Written

CHICAGO (ILL.) — Speaking to a score of student pilots, mechanics and fliers at the Hayes Hotel, here, Jack Atkinson outlined the work and progress being made by Dale Jackson and himself towards unionizing the aviation industry. Atkinson believes that by the end of this year 55,000 will be unemployed in the aircraft industry due to a large influx of student pilots and small-scale plane manufacture.

The financing of the Globe Aero Service Bureau has been undertaken thus far by the Globe Realty and Investment Co., which is owned by Atkinson and Jackson. It is Atkinson's plan to have the union absorb the realty concern.

The fees of the Globe Aero Service Bureau union are $10 per year, and at present a drive is on to obtain 25,000 members by June 1. The post of national director of the organization will be filled at that time.

A letter has been mailed to several prominent men stating in detail the union aims. The following received the letters: Senators McKellar (Tenn.), Johnson (Calif.), Bingham (Conn.), Grundy (Penn.), and Glenn (Ill.), Secretary of Labor, Davis, Representative Dyer (Mo.), and Attorney General Mitchell.

Offices of the organization are now at Kansas City and Chicago, while plans are under way for other offices on each coast.

A questionnaire to all members asks them to ballot on the following questions: Incorporation under the Trade Union Act, affiliation with American Federation of Labor, employment of a National Director, an insurance plan, standard or sliding wage scale, membership dues, location of the headquarters, general policies, and ratification of present leadership by Jackson and Atkinson.

Power Plant Makers To Confer in St. Louis

ST. LOUIS (MO.)—Meetings of the Motor Manufacturers Section of the Aeronautical Chamber of Commerce will be held here during the International Aircraft Exposition, Feb. 15-23. The proper methods for testing and servicing airplane engines, the devising of a system of discounts for plane producers, distributors, and service stations, and the problems and methods of merchandising power plants will be some of the subjects discussed.

There is a possibility that a change in the present standard of speed rating for engines will be suggested at the conferences here. The production reports of 25 engines makers during '29, garnered by the Chamber, will be presented to the manufacturers. On Feb. 20, the Motor Manufacturers Section will hold a joint meeting with the Commercial Airplane Manufacturers Section.

New Standard Plane of Type Ordered by Navy

A $50,000 ORDER for New Standard D-29A training planes such as the above, has been placed, as announced last week, with the New Standard Aircraft Corp., Paterson, N. J., by the U. S. Navy. The machine will take the service designation NT-1. Designed by Charles H. Day with the cooperation of Rostislaw Komarnitsky, the plane is a two-place craft employing Kinner power. Its dimensions are: span, 30 ft.; length 25 ft. 9 in.; and height 9 ft. Gross weight of the airplane is put at 1,610 lb.

Approve New American Eagle

WASHINGTON (D. C.) — Approved type certificate No. 293 has been issued for American Eagle 201, a three-place open biplane, powered with a Kinner engine; weighing 1,168 lb., empty; capable of a 782 lb. useful load, and weighing 1,950 lb. gross.

Several Orders Placed For Floyd Smith Chutes

TRENTON (N. J.)—Recently returned from a western trip, Harry J. Wolcher, sales manager of the Switlik Manufacturing Co., makers of Floyd Smith Safety Chutes, announces he contracted for more than 200 chutes.

Among orders received were: One from Midwest Airways, Milwaukee, for fifteen parachutes; one from Lincoln Airplane School of Lincoln, Neb., for twenty chutes; and one from the Pacific Aeromotive Corp., Los Angeles, for 60 chutes. An order now in production, delivery of which is to be made within the next two weeks, calls for several chutes for the Department of Commerce.

Floyd Smith Safety Chutes will be exhibited at the St. Louis show and plans are being made to demonstrate a model chute with a dummy.

Boeing Perfects Finishing Oven

SEATTLE (WASH.)—Boeing Airplane Co. has perfected electric baking ovens with temperature control which have been found satisfactory not only for obtaining the desired finish on such items as cowling, but for entire bodies which can be placed in a 30-ft. oven. As these ovens are thermostatically controlled, excess heat dangers are eliminated.

Commemorative Flight Precedes Legion Show

NEW YORK (N.Y.)—Commemorating the original flight of Glenn Curtiss from Albany to New York made 20 yr. ago, a group of prominent citizens will fly the same route on Feb. 7 to open the American Legion's Second Annual New York Aviation Show. An escort of five National Guard Falcons will accompany the fliers. John Boyd Thacher, II, Mayor of Albany, and Peter Brady, Chairman of the New York City Committee on Airports will represent the two cities.

One feature of the show will be the showing of the Fiat engines which have been popular in Italy. Two engines will be exhibited, an air and a water-cooled type.

The latest type military observation plane carrying a full load is to be shown. This Curtiss 0-1E will have Browning machine guns fore and aft, and a bomb rack carrying five 25-lb. bombs. It will also have complete radio equipment and navigating and landing lights.

The Army Air Corps will also exhibit a life size dummy used for drop testing parachutes, according to Major Ryan, of Mitchel Field. The latest type parachutes will also be on display as will also several Air Corps photographs and an exhibit of the process by which the mosaic pictures are made.

Coupe Top for Great Lakes Craft

CLEVELAND (OHIO) — Great Lakes Aircraft Corp. has developed a demountable coupe top and an exhaust heater for its Trainers and Sport Trainers. The landing gear may also be replaced with skis.

Garland Peed, Jr., Shown Seated in the Glider of His Design Now Being Manufactured by the Alexander Aircraft Co.

Production Started On Alexander Gliders

COLORADO SPRINGS (COLO.)—Production has started here on a high-lift primary glider designed by the Alexander Aircraft Co. The first of these craft, known as the Alexander Trainer, was sold to Pikes Peak Glidaire, Inc., an organization composed of business men in Colorado Springs. A number of flights of over 1,000 ft. and one of 46 sec. duration have been made from a 50 ft. hill into a seven to ten mile an hour wind.

The Alexander Trainer has a fuselage of welded seamless steel tubing, a wing area of 200 sq.ft., a 36 ft. wing spread, and large control surfaces.

Features include three roll shock absorbers cushioning the steel structure from the main oak skid, metal wing skids, a light steel seat adjustable to compensate for variances in pilot weights, and a novel prow hook from which a tow rope or shock cord will release itself automatically or can be released at any time by the pilot.

Laboratory break down tests on the wings showed a safety factor of 14.4 while sample wings, uncovered, sustained 1,731 lb. of sand for over five minutes. The Alexander firm by means of mass production, utilization of present factory machinery and airplane methods, states it will be able to turn out an all-round glider at a list price of $375. Plans for organizing glider clubs are being furnished the 176 Eaglerock distributors and dealers.

Emsco Has Movable Equipment

LOS ANGELES (CALIF.)—Small parts assembly tables and benches in the Emsco Aircraft factory are so mounted on castors that they may be moved from place to place about the plant, lugs being provided to rigidly anchor them wherever desired. Since the floor of the factory is of smooth concrete, it is possible for one man to rearrange the assembly line for any group of parts as may be required by production demands.

Increase Seattle Firm Capital

SEATTLE (WASH.)—Seattle Aeromotive Corp., located in this city, has increased its capital from $10,000 to $100,000.

Curtiss Reid Rambler Approved

MONTREAL (QUE.)—Having passed the official government test and been approved for various types of flying, the revised Curtiss Reid "Rambler" plane will be put into production at the Caryierville plant of the Curtiss Reid Aircraft Co.

Los Angeles Launches Glider 3,000 Ft. in Air

LAKEHURST (N. J.)—With the successful launching here of a secondary training type German glider from the dirigible "Los Angeles" in flight, plans are now being considered for equipping airships with them and further testing out the possibilities of releasing engineless planes from lighter-than-air craft. Rear-Adm. William A. Moffett, Chief of the Navy Bureau of Aeronautics, has suggested the scheme could be utilized for discharging passengers while a ship is in flight, and in time of war it might prove useful in carrying men and munitions to inaccesible areas where quiet landings could be made in gliders.

Lieut. Ralph S. Barnaby flew the glider after it had been released from beneath the "Los Angeles" in a manner similar to that of launching a bomb. Let loose at approximately 3,000 ft., Barnaby glided for 15 min. to make a successful landing on the Naval Air Station airport after having circled the field about a dozen times. The crossbar used in holding the glider to the dirigible was the same used in the plane-launching and taking-on experiments several months ago at Cleveland.

The problem of landing a ship in strange territory might be overcome by the use of a glider, believes Lieutenant Barnaby, by glider-launching several officers and crew, who, upon landing, could gather together a ground crew and instruct them as to the handling of the airship.

T.A.T. to Exchange Certificates

NEW YORK (N. Y.)—Henry Breckinridge, on behalf of the voting trustees of T. A. T., announces that the voting trust agreement dated June 10, 1929, will terminate on Feb. 11, 1930. After that date, voting trust certificates may be exchanged for par value capital stock.

Preliminary Glider Fete Planned for N. Y. in April

NEW YORK (N. Y.)—Plans have been completed for a glider carnival to be held at the Old Belleclair Country Club, Bayside, Queens, April 26-27, under the auspices of the National Glider Association, the Aeronautical Chamber of Commerce, the American Motorless Aviation Corp., and the Aero Club of Long Island. Edward P. Warner, editor of AVIATION and former Assistant Secretary of the Navy for Aeronautics, is to be chairman of the arrangements and judges committees.

More than fourteen manufacturers of gliders from the vicinity of New York are to provide gliders, and many pilots of powered aircraft are expected to take part in the carnival which will include experimental flights, contests, and examinations for glider pilots' licenses.

The carnival is planned as part of the advance preparation for the first national glider and soaring contest which will be held next September in which glider pilots from all parts of the country will compete.

Pittsburgh, Cincinnati Shows are Sanctioned

NEW YORK (N. Y.)—Six aircraft shows to be held during 1930 have been sanctioned by the Aeronautical Chamber of Commerce, information reveals. The last two additions to this list were the Cincinnati Aircraft Show, March 26-April 1; and the Pittsburgh Aircraft Show, March 6-15, both of which received "C" class sanctions.

The former exhibition is to be held in the Cincinnati Music Hall, and T. Higbee Embry, president of the Embry-Riddle Co., is chairman of the committee. The Aero Club of Pittsburgh is sponsoring the Pittsburgh display which will be staged at Motor Square Garden. Mayor Charles H. Kline is honorary chairman of the show committee and William J. Austin, general chairman.

Other exhibitions passed upon by the Chamber are: International Aircraft Exposition, St. Louis, Feb. 15-23; New York Aircraft Salon at Madison Square Garden, May 3-10; All American Aircraft Show, Detroit, April 5-13; and the Buffalo Aircraft Show, March 22-29.

Chamber Plane Section To Work Out Sales Policy

ST. LOUIS (MO.)—One of the most important topics to be discussed during the meeting of the Commercial Airplane Manufacturers' Section of the Aeronautical Chamber of Commerce on Feb. 17, during the air show here, concerns the need of building up of national aircraft sales organizations for the present year.

Among the ideas to be presented are the advisability of enlisting the aid of automobile distributors in handling aircraft sales rather than building up a separate sales organization, and the feasibility of issuing monthly production and sales reports on aircraft to members of the Chamber.

The manufacturers will also consider a code of ethics to be followed in the production and distribution of airplanes. This is now being drafted with the hope of eliminating any questionable phases that might have a tendency to creep into the industry. The group will also determine the need for a periodical meeting of purchasing agents.

At a joint meeting to be held with the Aeronautics Branch of the Department of Commerce on Feb. 21, the Commercial Airplane Manufacturers' Section will go over the airworthiness requirements needed to obtain an approved type certificate.

Klemin Heads Committee

A committee of the section drafting standard performance tests for planes will report its findings at the St. Louis meeting. The committee is headed by Prof. Alexander Klemin of New York University and includes a number of prominent aeronautical engineers. It is planned to draw up a uniform series of tests on which performance of planes can be computed, and in this way, it will then be possible to compare the performance of various planes on an equal basis.

Another important matter to come up before the gathering will be that of export trade. The export committee has been working on an aviation cable code to be used in the transaction of business which is designed to save the industry thousands of dollars.

The election of a chairman and executive committee of the section for 1930 will take place at the February meeting. A joint meeting of the Commercial Airplane Manufacturers with the Motor Manufacturers Section has been called for Feb. 20 to discuss problems faced by the two groups.

In all, sixteen meetings of sections of the Aeronautical Chamber of Commerce, Society of Automotive Engineers and Aeronautics Branch of the Department of Commerce have been scheduled for St. Louis during the International Aircraft Exposition. They will bring together the outstanding figures in all branches of the American aeronautical industry.

A joint banquet of the Aeronautical Chamber of Commerce and Society of Automotive Engineers is planned in the Hotel Jefferson, Feb. 19.

New Equipment for the Austin Co.

CLEVELAND (OHIO)—With the installation of electric welding equipment, The Austin Co. here will be able to double the capacity of its fabricating plant on Chardon Road.

Johnson Representative on Tour

DAYTON (OHIO)—L. E. Aman, sales manager of the Johnson Airplane and Supply Co., expects to cover 25 states and 15,000 mi. in the next three months on a trip during which he plans to call upon every airplane and plane accessory manufacturer and plane operating line in these states. Aman is making the trip in a specially constructed and equipped truck which carries samples of airplane equipment and supplies manufactured and handled by the Dayton concern.

New England Plans Tour, Dedication, Meet

SPRINGFIELD (MASS.)—An all New England Air Tour on May 28-29, dedication of the new Bowles airport, in Agawam, on May 30, and air races on May 31 and June 1, are events announced by the Aenonautical Development Committee of the New England Council, the Springfield Chapter of the National Aeronautic Association and the Springfield Air Races Corp., as the result of conferences that have been in progress among officials of the three organizations for the last six weeks.

The New England Air Tour is sponsored by the New England Council as a major step in its program to promote commercial possibilities of aeronautics in New England. It will start from the Springfield airport on Wed., May 28, and embrace the principal cities and towns of the six New England states.

Dedication of Bowles field will be under the direction of Springfield Chapter of the N. A. A. and will immediately follow the conclusion of the air tour. As a continuation of the air tour, the Springfield Air Races Corp. has been formed to carry out a program of aviation events on Saturday and Sunday, May 31 and June 1. These races will be sanctioned by the National Aeronautic Association, it is said.

Central offices for tour and races have been established in the new State Building in Springfield. Officials named by the New England Council and the Air Races Corp. to carry out the work are; Col. James W. Gilson, of Hartford, Conn., representative on the Aeronautical Development Committee, tour director; Frank T. Wyckoff, of Springfield, director of Springfield Chapter, clerk and manager of Springfield Air Races Corp.; and J. H. Fifield, of Springfield, advertising and publicity manager.

Diesel Firm Dissolves

DAYTON (OHIO)—Notice of dissolution of the Dieselaire Motor Co., Dayton, Ohio, has been filed with the Secretary of State by William G., E. P., and Edwin P. Matthews, Jr. The company was organized several months ago to conduct experiments on a new diesel-type airplane engine.

St. Louis Scene of S.A.E. National Aviation Meeting

ST. LOUIS (MO.)—It has been decided to hold the National Aeronautic Meeting of the Society of Automotive Engineers here Feb. 18-20, during the week of the International Aircraft Exposition as a tribute to Col. Charles A. Lindbergh. A program of twelve papers devoted to aeronautic engines, fuels, instruments, production and radio equipment will be presented to those attending the conference. The following is a list of the sessions:

Tuesday, Feb. 18. Engine Session, 10 a.m. Chairman, B. G. Leighton. "The Needs of Aircraft Operators in the Power Plant Field," Philip Johnson, Boeing Airplane Co.; "Ways and Means in Aircraft Power Plant Development to Meet Operators' Demands," Roland Chilton, Wright Aeronautical Corp.; "The Relation Between Automobile and Aircraft Engine Design," Robert Insley, Continental Aircraft Co.

Fuels Session, 8 p.m. Chairman, T. A. Peck. "Vapor-Locking Tendency of Aviation Gasolines," O. C. Bridgeman, Bureau of Standards, and Hobart S. White, Bureau of Standards; "Gasoline requirements of Commercial Aircraft Engines," H. K. Cummings, Bureau of Standards.

Wednesday, Feb. 19. Instrument Session, 10 a.m. Chairman, Ralph Damon. "Flight Test Instruments," J. B. Peterson, Bureau of Standards, and E. W. Rounds, Bureau of Aeronautics; "Fog Flying," Lieut. James Doolittle.

K. M. Lane to Speak at Dinner

Aircraft Dinner, 6.00 p.m. Toastmaster, Chance M. Vought. "Defects of Modern Aircraft," address by K. M. Lane, Department of Commerce. (Dinner to be held jointly with Aeronautical Chamber of Commerce.)

Thursday, Feb. 20. Radio Session, 10 a.m. Chairman, Col. Halsey Dunwoody. "The Suppression of Ignition Interference on Radio Equipped Aircraft," E. A. Robertson and Dr. L. N. Hull, Radio Frequency Laboratories, Boonton, N. J.; "Radio Communication and Transport Work," Herbert Hoover, Jr.; "Provision of Radio Facilities for Aircraft Communication," E. L. Nelson and F. M. Ryan, Bell Telephone Laboratories, N. Y.

Production Session, 8 p.m. Chairman, C. A. Van Dusen. "Production Methods of Airplanes," Wm. B. Robertson, Curtiss-Robertson Airplane Mfg. Co.; "Production Methods of Aircraft Parts," William F. Wise, Ex-Cell-O Aircraft & Tool Corp.

Move Pyle-National Boston Office

CHICAGO (ILL.)—An announcement from the Pyle-National Co. here states that the office of its Boston branch is now located in Room 901 of the Statler Building, following removal from the Little Building.

Several Aviation Bills Before N. Y. Legislature

ALBANY (N. Y.)—Various legislative proposals having to do with aviation are under consideration here. Among these is a bill, carrying no appropriation, to extend the life of the New York State Aviation Commission from March 1, 1930, to March 1, 1931.

Another bill provides that the owner, proprietor, or lessee of an airport or landing field, shall not be liable to the owner, proprietor, operator or passenger of an aircraft for injuries to persons or property unless such injuries result from the negligence of the owner, proprietor or lessee of the airport; while a similar provision releases the owner, proprietor or operator of an aircraft from liability to passenger for injuries unless such injuries are due to negligence in the operation of the aircraft.

A measure has been proposed requiring that all aircraft and operators be licensed in accordance with the rules of the Department of Commerce. There is also projected legislation which aims at complete regulation of flying within the state, defining possible offenses in considerable detail and specifying penalties.

The latest bills introduced call for state licensing and regulation of flying schools, under the terms of which the State Department of Education would have control of flying instruction. Senator J. Griswold Webb and Assemblyman Herbert B. Shonk are sponsors. The measure asks a fee of $10 for all schools for licenses, which would be granted only after approval.

Representatives Named

CURTISS-WRIGHT SALES CORP.—Curtiss Wright Flying Service of St. Louis, territorial distributor for central and eastern Missouri and central and Southern Illinois.

BARLING — Montgomery School of Aeronautics, for the state of Alabama. R. M. Ressler is sales manager.

DETROIT AIRCRAFT CORP. — Middle States Air Lines, Inc., Akron, Ohio.

N.A.A. Announces Races

WASHINGTON (D. C.) — Dates for two races to be conducted by the National Aeronautic Association have been announced and are; May 29-30, Gardner Cup Races, St. Louis; and May 28-June 1, (tentatively) Springfield, Mass., Air Tour which culminates in races. Members of the N.A.A. advisory board drew up a platform for the current year at a meeting held a short time ago and the program will be presented to the Board of Governors on May 12.

Plan First Omaha Air Show

OMAHA (NEB.)—This city is to have its first aviation show Feb. 17-22, inclusive, in conjunction with the twenty-fifth annual auto show to be held at the Ak-Sar-Ben coliseum.

Make P. & W. Tour in West

LOS ANGELES (CALIF.)—In an effort to make a survey of the users of Pratt & Whitney engines in the West and Northwest and to acquaint them with the authorized factory service offered by the Aero Corporation of California, this city, E. B. Haines, western representative of the engine company, and E. B. Smith, sales manager of the Aero Corporation, have made a two-week flying tour of the entire Pacific Coast region as far north as Seattle.

Schools and Colleges

ATLANTIC AIR COLLEGE, Newark, N. J., announces a ground school class opening this month to be held at the Central High School, and to consist of 25 two-hour lectures which will cover the necessary ground work for a limited commercial license.

BOEING SCHOOL OF AERONAUTICS, Oakland, Calif., reports that approximately 60 per cent of its students are enrolled in the advanced flying classes.

CURTISS-WRIGHT FLYING SERVICE. At Cambridge, Mass., a ground course has been arranged to meet two evenings a week for twelve weeks at Massachusetts Institute of Technology under the direction of Frank O'Connor.

At Chicago, a course is announced as opening this month which will be known as "Air Transportation," and which will provide highly technical training in the business phases of aviation. Thomas Wolfe, Jr., of the commercial department of National Air Transport and a lecturer on aeronautics at Northwestern University, will conduct the course.

At Los Angeles, the school which opened Sept. 10 now reports an enrollment of 106 students.

FLO FLYING SERVICES, INC., Ann Arbor, Mich., announces reductions in the prices of instruction courses ranging from $150 for the basic course to $550 for the transport course.

NATIONAL AIRWAYS, INC., School Division, Detroit, Mich., now has an enrollment of 102 students in its ground and flying courses.

PARKS AIR COLLEGE, East St. Louis, Ill., has added courses in cable splicing, and in the working of duralumin and alclad to the curriculum for mechanics. Three new postgraduate courses open only to licensed transport pilots are also announced. These are designed to qualify transport pilots for the new federal classifications which became effective recently.

STANDARD FLYING SCHOOL, Los Angeles, Calif., has introduced a special course for the training of pilots to operate crop dusting planes, which is said to be the only course of its kind in the country.

ST. LOUIS-UNIVERSAL FLYING SCHOOL announces that Walter Trefz, director of the downtown ground school, is organizing for Universal graduates an advanced course in the rebuilding of aircraft engines.

NEW PLANES

A fourteen-passenger tri-Wasp Ford seaplane, known as the 5AT type, recently underwent tests at the Philadelphia Navy Yard and will be demonstrated before officials in Washington very shortly. This all-metal craft, with two metal floats about 22 ft. long, can be converted into a wartime machine capable of holding 20 troops or can be turned into a bomber or torpedo machine. The 5AT seaplane has a useful load of 6,000 lb.

James H. Wedell and Harry P. Williams, of the Wedell-Williams Air Service, New Orleans, La., have started construction of a racing plane with which it is hoped to exceed 300 m.p.h. The craft will be powered with a 300 hp. engine and will be similar to the "We Will," a craft finished just too late to be entered in the recent air races at Miami. Features will include large wing-type radiators, completely retractable landing gear, and two sets of wings —one for ordinary flying and the other for racing purposes.

Despite adverse weather conditions, first flight tests of the Prudden-Whitehead monoplane, developed by the Atlanta Aircraft Corp., Atlanta, Ga., have been held. Powered by three Wright J6-7 engines, the craft is a low-winged, cabin type machine, with an eight-place capacity. It has a wing span of 66.5 ft., is 52 ft. overall, 15 ft. in height, and has a mean wing chord of 10.5 ft. Following completion of further tests, this corrugated aluminum craft will be produced in quantity by the company, it is stated.

At Wichita, a flight test is scheduled, as we go to press, on the two-place low-wing "Skylark" produced by the Watkins Aircraft Co. Static tests and stress analyses have been approved, according to advices, and the firm now plans to build 50 "Skylarks" in 1930. Powered with the 60 hp. LeBlond, the craft is to sell for $2,950 fly-away from the field at Wichita, Kan.

Tests which culminated in a cross-country flight to New York, have been given the plane equipped with the Rocheville variable camber airfoil, which was built in Los Angeles by Rocheville, Ltd., and developed by H. D. Rocheville. This five-place cabin plane has wing action which permits its camber to be changed from Clark Y to a modified Gottingen 387. Aerotruss brazed steel is used in the wing sections. The craft weighs 3,000 lb. empty, has a 46-ft. span, a length of 31 ft., a height of 9.5 ft., and a 7-ft. wing chord.

Work has been started by the Seattle Aeromotive Corp., headed by Capt. Willard H. Mohlar, on an eight-passenger cantilever monoplane, to be powered with a Pratt & Whitney Wasp. It is Captain Mohlar's plan to make a Seattle to Tokyo flight some time this spring or summer.

BRIEFLY

The dirigible Los Angeles will visit Cuba Feb. 15 on the occasion of the anniversary of the sinking of the Maine.

A total of 135 planes will participate in the Air Corps maneuvers at Mather Field, Sacramento, Calif., in April.

An involuntary petition in bankruptcy for Coastal Airways, Inc., has been filed in U. S. District Court. Roger Q. Williams, who re-accepted the position of president of the company after resigning last summer, recently resigned again, explaining that certain representations made to him were not carried out.

A number of Kansas City business men are planning to fly to Mexico City to be present at the inauguration of President-elect Ortiz Rubio.

Bids for supplying 400,000 yd. of grade A airplane cloth to the Navy Department recently opened were as follows: Batavia Mills, $.3223; Federated Textile, Inc., .339; S. B. Marks, .3426; Suncoock Mills, .338; W. Harris Thurston, .332; Clarence Whitman & Sons, .3675; William Whitman, .33; Wilson & Bradbury, .315.

McGill Aircraft Co., San Francisco, Calif., is offering a training glider built as a parasol monoplane with standard airplane controls, weighing 155 lb., for $795.

Mid-South Aeronautic Association, sponsored by the aviation division of the Memphis Chamber of Commerce, will hold its first convention there March 27-28. Invitations will be sent to Governors, Mayors, and chambers of commerce in the seven states surrounding Memphis.

More than 25,000 passengers have been carried during 4,000 flights from 100 cities within the past year in a Ford plane operated by Universal Flyers, Inc., under the auspices of Ford dealers throughout the country. Ray Loomis was pilot; Leo J. Rocca, president of Universal Flyers, organized the tour.

Lieut. Harold Bromley has placed an order for a Lockheed Sirius plane, powered with a Wasp Junior engine, to be delivered within 60 days. Shortly after that he will make another attempt to fly from Tacoma, Wash., to Tokio.

Sixteen men are continuing the hunt for the bodies of Carl Ben Eielsen and Earl Borlund, whose plane was found about 90 mi. from the steamer "Nanuk," ice-bound in the Arctic near Siberia.

Five Douglas observation planes, two Consolidated primary training planes, and one Douglas advanced training plane have been assigned to the New Jersey National Guard, 119th Observation Squadron.

Production of Gipsy-Moth planes has begun in the Curtiss-Robertson plant at St. Louis, and it is expected that the first one will be completed within a month. Machinery and material is arriving from the old plant at Lowell, Mass.

An air patrol of the St. Lawrence River to prevent smuggling is being considered by the Canadian government. If the service is inaugurated, two large seaplanes would be purchased for it.

In accordance with the recently passed state law, 69 Nebraska pilots have filed copies of their federal licenses with the railway commission, and 63 certified copies of aircraft licenses have also been filed.

Mrs. Charles A. Lindbergh recently received a first class glider pilot's license as a result of a glider flight made at San Diego, Calif.

Barling NB-3 monoplanes, manufactured by Nicholas-Beazley Airplane Co., will be equipped with air wheels hereafter when so ordered.

The percentage of deaths among Army personnel due to automobiles last year was greater than that due to airplane accidents.

Present plans call for the expenditure of at least $1,000,000 on air mail by the Canadian government in 1930.

Consolidated Aircraft Co. now has its factory and equipment opposite Buffalo on the Canadian side ready and will begin manufacture of planes, both for the Canadian market and for export.

Southern California chapter of N.A.A. is acting as a clearing house for glider information, and is prepared to furnish names and addresses of all American firms building gliders, or of all Southern California glider clubs.

Omicron Pi, a university aviation fraternity, has been organized by students of the aviation school, University of Miami, Fla.

R. E. Apthorp, Salem, Mass., has invented a new type anemometer which responds quickly to variations in wind velocity, with readings by means of a column of colored liquid in a glass tube.

A small hole near the tail of a plane which caused dirt and sand to accumulate at the rear of the fuselage was blamed for a recent crash in New Hampshire.

Stanley Electric Tool Co., New Britain, Conn., of which L. M. Knouse is president, is offering a complete line of electric tools suitable for aircraft manufacturing use. The company now maintains its own selling organization.

W. Harold Taylor, director of the aviation ground school at the University of Buffalo, has been appointed chairman of the Aeronautical Chamber of Commerce committee to consider problems in ground school education.

Because of protests from Portland pilots, the new St. Johns Bridge, a high suspension bridge over the Willamette River, will be painted some more easily visible color than the light green originally planned.

R. Ernest Tucker, sales and service manager for Kinner Airplane & Motor Corp., has just completed an extensive tour of the country. Leslie Bowman and C. A. Burrows are now conducting a flying tour of factories of eastern aircraft manufacturers using Kinner engines.

TRADE TIPS

It has been reported that

Los Angeles County Board of Supervisors expects to spend $735,000 for improvements at El Monte airport, including grading and surfacing of 300 acres, night lighting installation, erection of terminal building, meteorological station, radio station, two hangars, fences, sewer, water, and connecting roadway systems.

Henry Frese, newly appointed sales representative for Lockheed Vega planes in the southwest, with headquarters at Fort Worth, Tex., will appoint a number of Detroit Aircraft Corp. dealers in that territory.

Joliet (Ill.) park commissioners will receive bids Feb. 17 for grading and draining Joliet Airport. Further improvements will be made at the field when that is completed.

Ruckstell Corp., Los Angeles Metropolitan Airport, Van Nuys, Calif., will buy for re-sale or take on consignment any used plane which can be reconditioned for Department of Commerce license.

City Council of Vernon, B. C., will buy equipment for a new airport recently approved there.

Consolidated Mining & Smelting Co. of Canada, Ltd., Creston, B. C., plans to establish a flying school for employees, and will build an airport there.

Robertson Airplane Service Co. will build a new hangar at Lambert-St. Louis Field. The company is considering opening a branch at Kansas City.

Walker Airport, Windsor, Ont., is in the market for lighting equipment.

Montreal (Que.) Aerodrome Co. is in the market for equipment for a seaplane base.

A $50,000 municipal hangar will be built at Hastings, Neb., during 1930, and an additional hangar will be built at Lincoln (Neb.) Municipal Airport.

Texarkana (Ark.) Chamber of Commerce is planning to raise $50,000 to $75,000 for improving the municipal airport and building hangars, and installing other equipment.

New Firms Announced

CANADIAN AERIAL SURVEYS CO., LTD., Montreal, Que.; authorized capital $50,000.

STURTEVANT AIRCRAFT, INC., Chardon Village, Ohio; capital $10,000; by R. L., R. H., and S. S. Bostwick; to establish an airport and to operate a commercial plane service.

WILKSTRON - WIDENER MOTOR CO., Yakima, Wash.; capital $20,000; to handle airplanes and automobiles.

PERSONNEL

GRAHAM B. GROSVENOR, president of The Aviation Corp., and WILLIAM B. LOUCKS have been added to the board of directors of Western Air Express.

CHARLES A. VAN DUSEN, who has been with the company for seventeen years, has been made general manager of Glenn L. Martin Co., Baltimore, Md. He is also first vice-president and member of the board of directors.

C. A. Van Dusen

WILLIAM P. MACCRACKEN, JR. and JOHN J. MITCHELL, secretary-treasurer of N.A.T., have been elected members of the board of directors of Airport Development and Construction Co., Philadelphia, Pa.

ALLEN L. PATTERSON, formerly sales manager with K. G. Frank, New York City, has been made vice-president and general manager of the recently reorganized General Airplanes Co., New York, N. Y.

RALPH N. WEIL has been appointed sales manager of Weeks Aircraft Corp., Milwaukee, Wis. Officers were re-elected at a recent stockholders' meeting.

LIEUT. PAUL L. FOSTER has joined the aviation staff of Richfield Oil Corp., New York, N. Y., as salesman pilot.

THEODORE LYNN has been made sales manager of the Chicago branch of Air Associates, Inc. L. LUND, formerly with Universal Aviation Corp., has also joined the Chicago sales staff of Air Associates.

RALPH LEAVENWORTH, formerly with Paul Teas, Inc., advertising agency, has been made assistant general sales manager of The Austin Co., Cleveland, Ohio.

ARTHUR E. NELSON has been appointed assistant director of Universal Flying School in St. Louis, Mo.

WILLIAM TEMPLETON has been made permanent airport superintendent for Vancouver, B. C.

SHERMAN P. VOORHEES, manager of the Elmira (N. Y.) branch of General Aviation Co., has been made director of the company's ground schools at Syracuse, Ithaca and Elmira. FORREST B. WRIGHT, Cornell University, has been appointed assistant director.

CAPT. JACQUES M. SWAAB has been elected president of the National Bureau of Aviation Employment.

E. Q. B. HENRIQUES has been appointed chief pilot of Main Flying Service, Inc., Pittsburgh, Pa., replacing R. J. CLOHECY, who resigned recently. R. C. COPELAND will be associated with Mr. Henriques as assistant pilot.

FLOYD M. THARP, formerly chief engine instructor at Art Goebel School of Flying, has been appointed chief of the airplane engine department of National Aircraft Welding School, Kansas City, Mo.

RALPH A. NORDBERG has resigned his position as advertising and publicity manager for Travel Air Corp., Wichita, Kan.

A. C. MORSE has resigned as president of Ohio Seamless Tube Co., Columbus, Ohio, to become chairman of the board. He is succeeded by JUDGE EDWARD MANSFIELD. FRANK BENHAM has been made general manager.

WALLACE T. BACKUS has been appointed to have charge of a special campaign for New Standard Aircraft Corp., Paterson, N. J., in the private and sport flying markets.

ARTHUR E. NELSON has been appointed assistant director of St. Louis-Universal Flying School. WALTER TREFZ has been appointed director of the mechanics division of the school.

LIEUT. RUSSELL COOPER has been named to assist LIEUT. HARRY WEDDINGTON, executive officer, in the supervision of reserve corps training school activities at Love Field, Dallas, Tex.

LEE FLANNIGAN, formerly chief instructor for Aero Corp. of Calif., has been made chief instructor for Standard Flying Schools, an Aero Corp. subsidiary which will establish branch schools in various cities.

Lee Flannigan

BENJAMIN O'SHEA, formerly president, has been elected chairman of the board of Union Carbide Co. and Electro Metallurgical Co. FRED H. HAGGERSON has been elected president of both companies, and F. P. GORMELY vice-president and general manager.

CAPT. ROY N. FRANCIS has been named superintendent of Mills Field, San Francisco, Calif., following the resignation of BARTLETT STEPHENS, acting superintendent.

JAMES R. WILLIAMS, formerly general manager of Empire Air Transport, Inc., has been made aviation representative of Greenfield Tap and Die Corp., Greenfield, Mass.

CAPT. W. F. LONG, recently manager of the Dallas (Tex.) Curtiss-Wright Flying Service school, has been placed in charge of sales of Curtiss planes throughout the state. W. A. BOHANNAN succeeds him at Dallas. C. D. MCCABE has joined the Dallas sales staff of Curtiss-Wright Flying Service.

J. B. KLINK, formerly with Goebel Aviation Co., Inc., Kansas City, has been made sales and promotion manager of Dallas (Tex.) Aviation School.

A. D. CRUIKSHANK has been made temporary British Columbia manager for Western Canada Airways, Ltd., and has taken charge of the company base at Vancouver. MAJOR D. R. MACLAREN is in Winnipeg to establish the western link of the company's air mail service.

MISS HELEN V. COX has been made sales representative of Whittelsey Manufacturing Co. at Miami, Fla., and GEORGE B. KING has been appointed to a similar position at Jacksonville.

L. V. KERBER has been re-elected president of Spartan Aircraft Co., Tulsa, Okla. Other officers and directors of the company were also re-elected.

E. ALLEN has been made special test pilot for Boeing Airplane Co. to test new Army and Navy fighters. Later he will rejoin Boeing Air Transport as pilot.

AERONAUTICAL CALENDAR

Feb. 7-15	New York Aviation Show, auspices Aviators' Post, American Legion.
Feb. 15-23	International Aircraft Exposition, St. Louis, Mo.
Feb. 18-20	Meeting of Society of Automotive Engineers, St. Louis, Mo.
Feb. 20	Meeting of Committee on Airport Management, Standards and Ethics, Hotel Jefferson, St. Louis, Mo.
Feb. 20-22	Second Annual Aviators Reunion Aviation Post No. 651, American Legion, Chicago, Illinois.
Feb. 24-25	Conference on Aviation Law, Auspices Milwaukee (Wis.) Chapter, N. A. A.
Mar. 5	New York State Airport Conference, Auspices A. C. of C., Mark Twain Hotel, Elmira, N. Y.
Mar. 6-15	Second Annual Pittsburgh Aircraft Show. Motor Square Garden, Brown Boulevard, Pittsburgh, Pa. Show Director, Ray Krimm, Pittsburgh, William Penn, Hotel
Mar. 17	Regional Airport Conference for New England, Providence, R. I.
Mar. 22-29	Second Annual Aviation Exposition, Buffalo, N. Y.
Mar. 22-29	Camden, N. J., Aircraft Show, Convention Hall, Camden, N. J. L. D. Odhner, executive secretary, Hotel Walt Whitman Annex.
Mar. 26-Apr. 1	Cincinnati, Ohio, Aircraft Show.
Mar. 27-28	Mid-South Aeronautic Association Convention, Auspices Chamber of Commerce, Memphis, Tenn.
April 5-12	All-American Aircraft Show, Detroit.
Apr. 8-9	Meeting of Society of Automotive Engineers, Detroit, Mich.
May 3-10	New York Aircraft Salon, auspices Metropolitan New York Division, Distributor-Dealers Section, Aeronautical Chamber of Commerce, at Madison Square Garden, New York City.
May 14-16	National Conference, Airport Section, Aeronautical Chamber of Commerce, Buffalo, N. Y.
May 28-29	All-New England Air Tour, starting from Springfield Airport, Springfield, Mass.
May 30-June 1	Dedication and Air Meet, Bowles Airport, Springfield, Mass.
June 28	Annual R.A.F. Display, Hendon, Eng.
July 3-5	Western States Aeronautical Conference, Medford, Ore.
July 6	International Transportation Exposition, Warsaw, Poland.

AIRPORTS AND AIRLINES

Airways to Get Additional Aids

Navigational Facilities Allowed Bulk of Funds

WASHINGTON (D. C.)—Of the $9,204,830 recommended by the House Committee on Appropriations for the Aeronautics Branch for 1931, the sum of $7,994,000 has been allotted to "Air Navigational Facilities." This represents an increase of $2,485,380 over the appropriation for this purpose in the fiscal year ending in 1930 and is $250,000 more than the Budget estimates. Installation and maintenance of beacon lights, radio communications and radio range beacon stations, and the like, is covered by this appropriation.

The additional $250,000 over the Budget estimate was provided for starting work on lighting the Fort Worth-Birmingham route of 615 mi. and the San Antonio-Midland route of 285 mi. These two routes were to have been included in the appropriation but it came out in the hearings that unless the additional money was made available, work on them would have to be postponed at least a year in favor of two projects passed up this year. This situation was explained as due to the proposed diversion of funds in the 1930 appropriations from the other two airway construction projects to finance teletype installations. Thus the Aeronautics Branch was falling behind in its program because of the demand for the teletype systems. The additional money will practically bring the construction work back to the original schedule.

Distribution of Funds

The balance of the appropriation for air navigation facilities is distributed as follows: $870,461 for administration; $4,340,620 for the maintenance of existing airways and their equipment; $2,381,000 for new construction and maintenance; $101,000 for research and experimental work in radio aids, airway lights, fog instruments, radio beacons, etc.

The hearings disclosed the fact that $210 per mile is being asked for maintenance of the airways for 1931 as compared with $195 in the 1930 appropriation. This increase was explained by Capt. F. C. Hingsburg, chief, Airways Division, as due to the employment of additional weather information facilities and observers along the airways.

The sum of $410,620 was asked for maintenance of teletype installation at the rate of $70 per mile. Captain Hingsburg stated that the New York-Chicago airway of 1,200 mi. has been equipped

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State Air Laws Compiled

WASHINGTON (D. C.)—Continuing its campaign to encourage states to inaugurate aeronautical legislation supplementing the federal air laws, the Aeronautics Branch has announced the publication of a booklet on "State Aeronautical Legislation and Compilation of State Laws." This includes suggested state air laws which would make the federal type of regulation uniformly effective throughout the country for intrastate operations. The state air laws now in effect are included, also. The publication may be obtained free of charge on request to the Aeronautics Branch.

T.A.T.-Maddux Line Changes Announced

LOS ANGELES (CALIF.)—Extensive changes in the personnel and administrative system of T.A.T.-Maddux have been announced by J. L. Maddux, recently elected president of the line in place of C. M. Keys. Six officials of the system are connected with the company no longer and the executive headquarters have been changed from St. Louis to this city. Other divisional changes are expected and an announcement about these changes is due soon. The eastern division traffic office has been shifted from St. Louis to Port Columbus but no announcement has been made as to the new division superintendent.

The officials leaving the line are: Paul Collins, general superintendent; Don Bartlett, assistant general manager; Joseph V. McGee, vice-president in charge of operations; John Herlihy, chief engineer; Eugene Vidal, chief inspector; John A. Collings, superintendent of the eastern division. Closer co-operation between the airline and the Pennsylvania Railroad is promised but reports that the Pennroad Corp. has acquired control of the airline have not been accredited as yet.

Colonial Planes Have Radio

NEW YORK (N. Y.)—Mail and passenger planes of Colonial Air Transport, operator of the Boston-New York mail and passenger lines, have been equipped with radio-wireless sets, it has been announced. The mail planes have been fitted with a receiving set using a pole antenna for weather reports and the radio beacon. The company's Fords have been equipped with two-way sets, using the pole antenna for receiving and the wing-tip antenna for transmitting. R.C.A., R.F.L. and Western Electric sets have been installed on the Fords for comparative testing.

New Air Mail Measure Offered

Plan for Adjustments Given to Committee

WASHINGTON (D. C.)—A measure proposing the extension of the authority of the Postmaster General in the administration of the air mail was presented to the House Committee on Post Offices and Post Roads by Postmaster General Brown during the past week. Committee action is expected upon it in the near future. In view of the approaching termination of the first five air mail contracts on April 6 it is hoped that the recommendation of the Postmaster General will receive immediate attention from the House when reported out by the Post Office Committee.

Features forecast in his Cleveland speech are understood to be embodied in Mr. Brown's recommendation. One of the most important is that empowering the Postmaster General, in stating air mail routes, to extend or consolidate routes as the public interest may demand. This would effect particularly the short lines and feeder lines now existent, and would make for economies in operation. Under present law the Postmaster General may not extend routes more than 100 mi.

To Protect Pioneers

Provision for the protection of pioneer lines, both air mail and passenger, is believed to be carried in the legislation proposed by Mr. Brown. The Postmaster General would be instructed, it is understood, to give due consideration in stating routes and awarding contracts to the merits of air mail and other operators in relation to the lines they have been running and the service rendered. The Postmaster General also would be authorized to contract by advertisements for bids, or by negotiation without advertisements when necessary in the public interest.

The basic rate of $1.25 per mile flown by the mail planes suggested by Mr. Brown in his Cleveland address is understood to be embodied in his recommendation. Variant compensation for night flying, difficult terrain and atmospheric conditions are not carried in the bill, and will be worked out after its passage. Although the basic rate is considered low by some operators it is believed that the rate of payment for the higher poundages will be greater in proportion than the maximum fixed for the 1,500-lb. space. While this basic rate will place a premium on economical operation, the benefit of having a fixed and constant income is expected to work

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AIRPORT CONSTRUCTION PROJECTS

South

A BEACON LIGHT will be installed immediately atop the administration building of the S. A. T. airport in New Orleans, officials of the Gulf Coast Airways have announced. Also, plans are going forward rapidly for installing a battery of eight floodlights at the airport.

The new Valdosta (Ga.) Airport includes 140 acres with three runways each 3,500 ft. long by 300 ft. wide, making it possible for aircraft to land and take off regardless of the direction of the wind. Work has been started and the port will be finished in about two months. At that time plans will be made for the purchasing and erection of hangars and other buildings.

The House of Representatives Military Affairs Committee has reported favorably on a bill authorizing the Secretary of War to acquire 71 acres of land to be added to Maxwell Field, Montgomery, Ala., and also another bill authorizing an appropriation of $20,000 for improvement of the quarters of noncommissioned officers at the field.

Thomasville, Ga., has just leased a 214-acre tract of land adjacent to the city limits for use as an airport. The land was leased for a period of five years at an annual rental of $500 a year and privilege of purchase at any time within that period for $200 an acre. It will be developed immediately.

Shreveport, La., has bought 330 acres for $152,000 for the benefit of a municipal airport. This site is within a few miles of the tract which has been set aside for the Air Corps Third Attack group base. The city recently issued $300,000 worth of bonds for the project.

Preliminary work has been completed on the Vero Beach (Fla.) Municipal Airport and the work of installing the border lights will be started soon. The city contemplates purchasing a beacon.

Southwest Air Service, Inc., Haywood Helms, president, Houston Airport, Houston, Tex., is reported planning to establish an airport at Goose Creek, Tex.

The Little Rock City Council has passed an ordinance authorizing the purchase of the Fourche Dam, a tract of about 600 acres, for development as a municipal airport. It is expected the land will cost about $100,000 leaving about another $100,000 of the bond issue for the development of the tract. This problem of a new site for the proposed Little Rock Municipal Airport has been under consideration for some time.

An extensive roof-marking drive has been launched among small Texas communities by the Dallas Chamber of Commerce.

The Dallam (Tex.) County Commissioners have voted for the establishment of a 640-acre airport at Dalhart, Tex.

Southern Air Transport Flying Service has been granted permission by the Federal Radio Commission for a 250-watt radio transmitter at El Paso. Similar stations are to be erected at Houston, San Antonio, Fort Worth and Waco.

The new Brewton (Ala.) Municipal Airport was dedicated recently.

Central

Plans have been made by the Chamber of Commerce of Orrville, Ohio, for the purchase of land for an airport for that place. Cost of the land and construction of the airport will amount to about $12,000, it is stated.

A water supply system for the Lincoln (Neb.) Municipal Airport will be completed this spring. The sum of $81,574 has been expended on the airport to date.

Topeka Airport & Aviation Co., care W. T. Dawson, 1345 Fillmore street, Topeka, Kan., has completed plans for construction of 60x80 ft. hangar.

Porterfield Aviation Interests, Inc., have leased the Falls City (Neb.) Airport for seven years at the rate of $560 annually. The Kansas City company is assuming all expenses of the field, and will maintain police and develop the port, which comprises an 80-acre tract of land a mile from Falls City. The company will also give a complete aerial service, including a flying school.

The Zanesville (Ohio) Municipal Airport site was leased recently at a special meeting of the city council.

The Corman Co., Auburn, Ind., is reported to have taken an option on a site and may establish an airport near Tampa, Fla.

The $20,000 bond proposition for purchase of a municipal airport, by Centerville, Ia., was carried at the recent election.

Hastings, Neb., has sold its $50,000 bond issue, and will soon select site for its airport.

West

Under the auspices of the Ajo (Ariz.) Chamber of Commerce a 200-acre airport measuring about 4,000x2,300 ft. with eight runways is being developed. This airport has been designated as an airport of entry by the Treasury Department.

Ponca City, Okla., of which G. Smee is city manager, is soon to begin construction of hangar and administration building at the municipal airport, to cost about $40,000. E. O. Bennett, 1127 So. 7th St., is city engineer.

An issue of $10,000 in bonds have been authorized sold at par at 6 per cent for development of the Burley (Ida.) Airport. Work is progressing at the airport and two runways and border lights are being installed.

North Central

Dan Kizer, manager of the new Milwaukee Air Terminals, Inc., operating the 131 acre base of the Curtiss-Wright Flying Service, announced recently that the new field will begin operation about May 1. By the time of opening of the field, approximately $700,000 will have been spent on the airport. This does not include equipment which will cost around $100,000. Three planes already are being operated. Two hangars are being built, each to have a capacity of twenty-five average size planes. A 130 x 145 ft. concrete apron also will be laid as soon as the weather permits. The field itself has been graded and is in good shape. Steel framework of hangars is up and workmen are awaiting favorable weather to go ahead with completion.

Erection of one 110 x 80 ft. hangar for land machines, and another 120 x 80 ft. for seaplanes, has been approved by the Vancouver (B. C.) airport committee of the city council as a minimum first development of the civic airport. First plans include also an administration building, which will be added to later. Aprons, runways and landing strips, beside necessary work about the site, which is a waterfront property in a suburb south of the city, will bring the cost of the first stage of the airport to $246,000. Successive stages will bring in a vastly increased administration building, besides additional landing and takeoff space. Ultimately five runways will be laid down around a takeoff circle 1,000 ft. in diameter.

A tract of some 500 acres with several thousand feet of frontage on the St. Lawrence River has been acquired by Montreal Airdrome, Ltd., for development as a combined land and seaplane base.

East

Establishing of the proposed Glenn H. Curtiss Commemorative Airport at Hammondsport, N. Y., in memory of Glenn H. Curtiss, has been disapproved by Alexander MacDonald of the New York State Conservation Commission, on the ground that the territory proposed for the port is a state park and as such remain as an existing public park.

The Buffalo conference concerning leasing plans for the proposed marine airport has been held but the matter has been referred to the new airport advisory committee. Consolidated Aircraft Corp. made the only definite offer, promising it would lease one-half of an 80x220-ft. hangar at an annual rental of 6 per cent of the cost of construction.

A public drive for stock subscriptions totaling $250,000 has been held by the Capital Landing Field Co. of Harrisburg, Pa. About $158,000 had been raised when General Pershing presented medals and ribbons to the crew of salesmen for their work in the campaign.

The latest report from Philadelphia regarding the Hog Island Airport plan is that the Shipping Board has offered Hog Island to the city for $3,000,000. This offer is now before the City Council with the Mayor's approval.

About $1,000,000 has been expended at Roosevelt Field, L. I., for the seven new concrete and steel hangars now nearing completion. Each hangar measures 143x142 ft. outside dimensions with a floor space of about 16,900 sq.ft.

Western Air Issues Statement for 1929

LOS ANGELES (CALIF.) — During 1929 Western Air Express increased its daily scheduled mileage from 2,400 to 7,200. The company reports its passenger traffic and passenger revenues increased almost four-fold during the year and that the close of the year showed a gross revenue of $2,950,921.59 for mail, passenger and other operations with a profit, before Federal Income Tax, of $1,087,852.60. This was an increase of slightly more than 50 per cent over the $720,777.80 profit of 1928 and permits an earning of about $9 per share.

About 90 per cent of the gross operating revenue for 1929 was derived from the Los Angeles-Salt Lake City and the Cheyenne - Denver - Colorado Springs-Pueblo mail lines. The increases in daily mileage are distributed as follows: 2,860 mi. on the Los Angeles-Kansas City route; 1,200 mi. on the night air mail service between Los Angeles and Salt Lake City; 730 due to doubling of the Los Angeles-San Francisco passenger service; and 200 mi. on the passenger service between Los Angeles and Agua Caliente.

The Consolidated Operating Statement Western Air Express, Inc., and Western Air Express Corp. as of Dec. 31, 1929, was:

Revenues:		
Mail	$2,354,985.10	
Express	10,993.63	
Passenger Service	484,077.18	
Baggage—Excess	768.65	
Special Service	75,139.93	
Airplane Rental	24,957.10	
Total Revenues		$2,950,921.59
Expenses:		
Overhead—General	$286,584.29	
Overhead—Traffic	208,802.11	
Maintenance of Fields	190,925.65	
Maintenance of equipment	288,264.26	
Transportation	478,805.62	
Communication	39,201.98	
Depreciation	407,205.32	
Insurance—Crash	56,000.00	
Total Operating Expenses		1,955,789.23
Net Profit from Operations		995,132.36
Add: Other Income: Interest, Discounts and Miscellaneous.		92,720.24
Carried to Surplus.		$1,087,852.60

Organize Dixie & Northern Line

LANSING (MICH.)—The Michigan Public Utilities Commission has authorized the Dixie & Northern Airlines, backed principally by a group of Detroit business men, to issue $100,000 in capital stock to finance its prospective aerial passenger line from Detroit to Miami, Fla. About eighteen months ago the Commission approved the company's issuance of $250,000 in stock, but later rescinded the authorization pending changes in management. The changes have been made.

N. Y. State Port Conference

NEW YORK (N. Y.)—A state airport conference is to be held at Elmira, N. Y., Wednesday, March 5, at the Mark Twain Hotel under auspices of the Airport Section of the Aeronautical Chamber of Commerce.

New Air Mail Stamp To be Issued Feb. 10

WASHINGTON (D. C.)—On Feb. 10, a new five-cent air mail stamp will be placed on sale. The new stamp will be printed in purple, instead of red and blue as at present. Its central design will be a globe with wings on either side, the insignia of the air mail pilot. "U. S. Air Mail" will be printed across the globe, with "U. S. Postage" at the top and the numeral "5" in circles in both lower corners.

Airways to Get Aids

(*Continued from page 267*)

with this device. Under the 1931 appropriation it is hoped to extend this service an additional 5,000 mi.

Considerable comment was made by the Committee over the fact that money provided for airway lighting was to have been diverted for the teletype. Both Clarence M. Young, Assistant Secretary, and Captain Hingsburg explained the action was somewhat in the nature of an emergency and had been taken upon the strong recommendation of experts. It was found in the year's operation of the test service between New York and Chicago that the transport companies had decreased their delays and defaulted schedules by more than 30 per cent and there had been a marked decrease in loss of equipment and life, making the teletype almost a necessity.

New Construction

Mr. Young stated that 2,880 mi. of airways are to be lighted under this appropriation at the rate of $370 per mile; 20 radio communication stations are to be erected at a cost of $21,000 per station and a total cost of $420,000; 99 radio marker beacons costing a total of $89,100 at the rate of $900 each are to be installed, and fifteen radio communication stations costing $12,000 each will be built.

Under this program there will be at the close of the 1931 fiscal year: 17,380 mi. of lighted airways; 45 radio communication stations; 26 radio range beacons. The new airways to be lighted are: Columbus-Philadelphia, 413 mi.; Jacksonville-Richmond, 550 mi.; San Diego-Fort Worth, 1,206 mi.; and Fort Worth-Louisville, 805 mi. As much work as the extra fund of $250,000 will permit will be done on the Fort Worth-Birmingham and the San Antonio-Midland routes of 615 and 285 mi., respectively. These routes will be recognized as important sections of the airways approved by the Interdepartment Committee on Airways following hearings held during the latter part of 1929.

New Code Looms For Transport Lines

WASHINGTON (D. C.)—The departmental committee appointed by Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, to study the suggestions developed at his conference with the representatives of the major transportation companies regarding revision of air transportation regulations, has returned an eight-page report to the operators for their further consideration. The committee was composed of Col. H. H. Blee, director of Aeronautical Development; Capt. F. C. Hingsburg, chief, Airways Division; W. Fiske Marshall, chief, Licensing Division; Joseph S. Marriott, chief, Inspection Service; Capt. Walter F. Parkin, supervising inspector of the Department in Southern California; Frederick R. Neely, chief, Information Division.

At the meeting held on Feb. 3 the fundamentals covering the new regulations were agreed upon. Details of the specifications for the various requirements of airworthy aircraft, airways, personnel and equipment are to be worked out by the Aeronautics Branch and submitted by mail to those operators not represented at the conferences.

Radio Aids Emphasized

One of the most important factors making for safety in flying, in the opinion of the committee, is the utilization of all radio facilities. Although the recommendations drawn up are only tentative, it is understood it is the Department's intention to require the use of all radio equipment which is commercially available.

Short lines now being developed will be particularly effected by the proposed addition to the air regulations allowing scheduled flying only over approved airways fully equipped with all safety devices, including emergency fields. Lines whose routes extend over unapproved airways will have to suspend operations until air navigation facilities are installed, either by the government or themselves.

Other points discussed in the conferences were the desirability of requiring clearance papers for planes, similar to the railroad system of checking all servicing and inspection details on a printed form which is presented to the engineer; the practicability of blind flying instruments; the necessity of thoroughly qualifying dispatchers and operations officers; and the periods of overhaul for engines and planes, based on type of equipment and conditions under which it habitually is used.

Operators present at the conferences were P. G. Johnson, representing United Aircraft; Col. Paul Henderson and Lester Seymour, for N.A.T., T.A.T.-Maddux, and E.A.T.; Hainor Hinshaw and Col. Halsey Dunwoody of The Aviation Corp.; James G. Wooley and W. M. Bishop of Western Air Express; L. H. Mueller of Varney. Northwest Airways and National Parks Airways were represented by proxy.

Houston-San Antonio Line Opened by S.A.T.

HOUSTON (TEX.)—A new passenger service between this city and San Antonio was placed in operation Jan. 24 by Southern Air Transport, a subsidiary of The Aviation Corp. Planes leave here at 10:30 daily and arrive in San Antonio at 12:45 p.m. The Dallas-Brownsville service of the same company has rearranged its schedule to permit connections between the two lines. The plane leaves San Antonio for Brownsville now at 1:15 p.m. and arrives there at 4:30. Passengers may continue on to Mexico City over the Mexican Aviation Co.'s line the next morning.

The northbound plane leaves Brownsville at 1:15 p.m., and arrives in San Antonio at 4 p.m. The Houston plane arrives at 6:15 p.m. The fare between Houston and Brownsville is $25.22 and between Houston and San Antonio $10.80. By using trains between Houston and New Orleans a passenger may reach Mexico City from New Orleans in about 38 hr., while the journey in the other direction may be made in about 24 hr.

New Mail Measure

(*Continued from page 267*)

to the advantage of the operators.

That air mail lines may go into the passenger business has been suggested in connection with the Postmaster General's proposition to place mail on passenger lines. Air mail contractors who collaborated with the Post Office Department in formulating Mr. Brown's recommendation to Congress are understood to have been almost uniformly in accord with the ideas advanced by the Postmaster General. Among the representatives of the industry who conferred the the Post Office were P. G. Johnson of Boeing, Col. Paul Henderson of N.A.T., and Hainor Hinshaw of The Aviation Corp.

Additional Rates Possible

"Air Mail" is understood to have been defined in the pending legislation as mail of all classes authorized to be carried by aircraft under rulings to be established by the Postmaster General. The present rate of $0.05 an ounce for first class mail is continued, with the provision that the Postmaster General may set the rates for the other classes, provided they do not exceed that for first class.

Provision is also understood to be made that the carriage of domestic or foreign mail on existing or extended routes serving Mexico, and Canada may be paid for from the appropriation for domestic air mail service. The clause in the amended act of May 17, 1928, allowing the surrender of a contract after two years' satisfactory service and the issuance of an eight-years' certificate to replace the contract is believed to be continued in the proposed bill.

Airway Briefs

T.A.T.-Maddux Airlines carried 79 passengers between Waynoka, Okla., and Columbus, Ohio, on Jan. 26, a total of 73,075 passenger mi., establishing a company record for operations to date. Two planes were used to carry eastbound passengers.

Curtis L. Coulter of the Illinois Bell Telephone Co. has developed an automatic lighting device for the wing tips of planes which indicates the direction of bank, and consequently the course the plane is taking, by colored lights. This is designed to assist pilots approaching each other at night to detect the other's maneuvers.

Test flights have been made over the route to be established by International Aviation Corp. between Kansas City and Mexico City, and regular operation is expected to begin soon.

The air mail route is 317 mi. shorter than the railway distance between San Francisco and Chicago, 301 mi. shorter than the railway distance between Los Angeles and Seattle, according to figures recently compiled by the Boeing company.

The traffic personnel of T.A.T.-Maddux at Port Columbus has been reduced from three men to one.

A pneumatic tube for mail has recently undergone successful tests in New York, and it is proposed to build such a tube from the Post Office to Floyd Bennett Field, Brooklyn, to save time in the handling of air mail.

Five planes have already been transferred to the new Curtiss-Steinberg Airport, East St. Louis, Ill., for storage. The runways will be covered with straw until spring.

Survey of a Canadian transcontinental air line as far as the foothills of the Canadian Rockies will be completed during March, and the route will be lighted by gasoline flares every 30 mi. Citizens of Vancouver, B. C., are requesting the government to appropriate $250,000 for completion of the survey.

Recommendation has been made by Hunter C. Baker, chairman of the airways committee of Tampa, Fla., for the appointment of a state supervisor of airports.

A California jury recently failed to reach a verdict in a suit brought by the owner of a chicken ranch adjacent to the Tulare (Calif.) Municipal Airport, complaining that the dust and noise incidental to the operation of the field interfered with his business.

Curtiss-Reid Aircraft Co. have inaugurated a series of week-end flights from the Cartierville Airport near Montreal to the Laurentian Mountains.

The Worcester (Mass.) Airport will be closed March 1 by vote of the directors. The city council recently refused to purchase the field at the price asked.

Mid-Continent Air Express Co. has leased part of the municipal airport at Denver, Colo., for the erection of hangars.

Airlines in Oklahoma, including Braniff division of Universal, S.A.F.E., and Central division of Universal, have flown over 3,050,000 mi.

An agreement for expediting traffic between Denver and Kansas City has been made by Western Air Express, Mid-Continent Air Express, and Universal Air Lines. involving the use of Universal Lines between Kansas City and Wichita, Kan.

California State Chamber of Commerce is undertaking a comprehensive survey of all airports now in use within the state, and a report analyzing the economic factors to be considered in the operation of each will be made.

Standard Oil Co. of Nebraska has offered the use of its 341 stations throughout the state for air markers, and the roofs, averaging 24 x 11 ft., will be painted through the co-operation of the American Legion.

General Electric Co. is experimenting with a new type of electric arc airway beacon for use under fog conditions.

Colonial Air Transport reports an increase of about 100 per cent in New York-Boston traffic during the first week after reduction of rates.

Gulf Coast Air Lines plans to inaugurate service soon between Baton Rouge, Alexandria, Crowley, Shreveport, Monroe and Lake Charles, La., and Hattiesburg, Laurel, Gulfport, Jackson and Biloxi, Miss.

Nine beacon towers have been installed on the Atlanta-Jacksonville section of the Atlanta-Miami airway, and complete lighting of the route is progressing rapidly.

Present plans, contingent upon complete installation of lighting equipment, call for inauguration of service over the Atlanta-Chicago route by Feb. 15.

Stout Reduces Charter Rates

DETROIT (MICH.)—Charter rates on all equipment of the Stout Air Lines have been reduced, according to a recent announcement by Stanley Knauss, vice-president and general manager. Wright engined Fords, Mr. Knauss said, now can be chartered for $120 per flying hour, instead of $150. Wasp powered Fords have been reduced from $175 to $150 per flying hour. The four-place Fairchild cabin monoplane rental was brought down to $40 per hour, or $.40 per mile.

Award Manitoba Mail Contract

OTTAWA (ONT.)—Contract for carrying air mail into the Central Manitoba mining region and Hole River district has been let to the Western Canada Airways, Ltd. The contract calls for a semi-weekly mail from Lac du Bonnet to Bisset and Wadhope. The contract price was $6,000 and the maximum load per trip will be 400 lb. The service will stop after the opening of navigation. Inauguration of the Prairie Air tion.

FOREIGN ACTIVITIES

Lloyd's Announces Air Insurance Group

LONDON (ENGLAND) — Last October it was announced by the Committee of Lloyd's Register of Shipping that a department for the inspection of civil aircraft had been formed, and that steps were being taken to form a special Aviation Advisory Committee, which would include some of the principal representatives of the various flying interests in the United Kingdom.

This committee has now been formed and consists of fifteen members, including Sir S. George Higgins, chairman Lloyd's Register; Arthur L. Sturges, deputy-chairman Lloyd's Register; J. Howard Glover, chairman sub-committees of classification; Percy Hargreaves, chairman of Lloyd's and member of committee of Lloyd's Register; A. G. Lamplugh, underwriter, British Aviation Insurance Group; three representatives of the Society of British Aircraft Constructors with F. Handley Page as chaiman; Lieut.-Col. J. T. C. Moore-Brabazon, representing the Royal Aeronautical Society; Sir Philip Sassoon, M. P., representing the Royal Aero Club; Air Vice-Marshal Sir Vyell Vyvyan, representing Imperial Airways, Ltd., and a representative still to be elected for National Flying Services, Ltd.

This committee will be well qualified to render valuable service in promoting the development on sound lines of civil aviation. Its formation indicates that activities of Lloyd's in this branch of work will be gradually extended, and will in time embrace many of the services which Lloyd's Register has so long and successfully rendered in the sphere of shipping.

Lloyd's surveyor for aircraft, L. J. Hill, was previously stationed at Croydon in charge of the inspection of civil aircraft on behalf of the Air Ministry, and his services are at the disposal of owners of aircraft and others who desire his advice. A number of inspections for the renewal of certificates under Air Ministry Regulations have already been held, and a large number of surveys on behalf of underwriters and others have been undertaken.

To Aid French Colonial Lines

PARIS (FRANCE) — The Institut Colonial Français has created its "Comité de l'Aéronautique et de la Meteorologie Coloniales." The chairman is General Hirschauer and the vice-chairmen are Colonel Brocard, Count de la Vaulx, Governor General Merlin, A. Michelin, General Patey and G. Philippar.

Comper Co. Builds Light Plane

LONDON (ENGLAND) — A company comparatively new to aircraft building recently demonstrated a new sport light plane at the Hooton Airdrome. The demonstration was made by its designer and builder, Flight-Lieut. N. Comper, who with his brother is operating the Comper Aircraft Co. at Hooton. This machine weighs only 670 lb. and looks no larger than a saloon automobile. Its wing span is but 24 ft., and it can attain a speed of 100 m.p.h. Its cost is about $2,000 and arrangements have been made for its purchase on the installment plan. A suit-case locker is fitted in front of the cockpit and a locker for golf clubs at the rear. The plane, intended for private owners for pleasure trips or club purposes, is called the Comper Swift.

Changes in Schneider Race Rules Approved

LONDON (ENGLAND) — Revised regulations have been approved for the Schneider Trophy Contest of 1931. If there is a challenge to Britain, the race again will be held over British waters, most probably over the Solent.

At a recent meeting of the committee of the Fédération Aéronautique Internationale in Paris, certain amendments proposed by the British Royal Aero Club were discussed. The chief change adopted is that both the navigability trials and the actual speed contest shall be held on the same day, as it is considered almost impossible, at any rate in England, to have suitable weather for two days running. The weather was particularly fortunate last year.

It was further decided that, as the cost of the contest is now so high, the entrance fee should be raised in order to afford some guarantee that a nation intends seriously to compete nine months or a year later. Accordingly, entries must be accompanied by a guarantee of about $40,000. The committee also decided that the contest must be held between June 1 and Sept. 30. All these decisions are subject to ratification at a full meeting of the Federation to be held in June.

The present position is that England holds the trophy, has won it twice, and if she is successful in 1931 will win it outright. The "if," however, is a very large one, as the Air Ministry has withdrawn from official participation in the race, taking the view that private enterprise should now be able to carry on the burden. But this is a political decision and it is thought that the Ministy will still help by encouraging the building of new high-speed seaplanes and lending them to the entrants.

R.100 Establishes World Speed Record

By Aviation's British Correspondent

LONDON (ENGLAND) — An unofficial world's speed record for airships has been created by the Burney airship R.100 on her third flight when in officially observed and carefully checked trials she reached a speed of 81.5 m.p.h. This is a notable achievement and Sir Dennistoun Burney said afterwards that the engines even then were not running at maximum power. Its significance in his mind was that it brought the 90 m.p.h. airship within sight. R.100, it will be recalled, has six Rolls Royce Condor engines of 700 hp. each arranged in tandem in three cars and Sir Dennistoun Burney explained that after further adjustments the contract speed of the ship, 70 m.p.h., could be reached with two power cars only.

This high speed, which is believed to be 1½ m.p.h. better than that achieved by the Graf Zeppelin is more interesting as R.100 had really left her shed to try out at high speed the unsatisfactory behavior of the envelope described in a previous report. It has triumphantly withstood now the test of extreme speed which means one important and possibly vital test has been successfully passed. The prize of success is well worth having for it means that the covers of airships can now be held rigid in service while a saving of 4 tons in weight is made over the reefing girder system of R.101. The test of long service is now needed to establish that the system remains rigid and that its cost of maintenance is low. With these facts established a notable advance has been made in airship design. R.100 runs very steadily at high speed and everyone is apparently satisfied that she is a well found ship.

R.101 Under Repairs

Meanwhile the R.101 is in the other Cardington hangar undergoing important modifications rendered possible as a result of the flight trials, and this will, it is estimated, increase her disposable load by no less than 15 tons. One of these is the insertion of a complete new bay next to the passengers quarters at about the point of maximum girth. This will increase the gas capacity about 500,000 cu.ft. Due to the pin pointed construction of the framework it will be a simple matter to split the strip in half, insert the extra bay and re-pin the two halves. The alteration to the streamline shape will be so slight that the speed will be affected only by a decimal point and the rebalancing of centres of buoyancy and gravity can be secured equally simply by shifting some of the storage tanks

(Concluded on page 272)

Data on French Racers Announced

PARIS (FRANCE)—Some data on the racing seaplanes now under test at Hourtin, near Bordeaux, have been made available. The Bernard machine flown by M. Paillard [See AVIATION for Feb. 1] is not the actual model built for the Schneider contest, but a special land plane provisionally fitted with twin floats. It is a thick-wing monoplane with Hispano-Suiza watercooled V-engine of 600 nominal horsepower, tuned to attain 2,400 r.p.m., and develop about 1,000 hp. The wing now fitted has an area 129.1 sq.ft.; the racing wing has but 97 sq.ft. The floats are of duralumin, with fuel tanks in the middle section.

The Nieuport-Delage machine, also a monoplane, is of the semi-cantilever type, with a slight dihedral. The radiators occupy the whole area, both on the upper and lower surfaces. The engine is a 1,500 hp. racing Hispano-Suiza with three banks of cylinders, the outer ones being nearly horizontal so that the section is very like an inverted T. The wing is fixed under the fuselage. The floats are made of veneer.

General specifications are as follows: Span, 29.6 ft.; length, 22.8 ft.; height, 8.6 ft.; area, 172 sq.ft.; weight, 3,970 lb. Tank capacity is 106 gal., sufficient for a duration of 45 min. A metal variable-pitch propeller is fitted.

R.100 Makes Record

(*Continued from page* 271)

from one transverse frame to another.

Another important modification is that of letting out the wire meshes enclosing the gas bags to increase their capacity. Before the trials a very generous clearance between the gas bags and the frame work was decided upon to make certain no lateral pressure came on the girders and flight trials showed that at least 3 in. of that clearance is not needed. Then the servo motor for the controls is to be removed, together with other duplicated fittings, all of which in the sum total will materially improve the relation of total lift to dead weight.

It is hoped too that a satisfactory duralumin forged airscrew blade will soon be available to enable all engines to be used with reverse gear, and a duralumin crankcase for the Tornado compression ignition engines. A small compression ignition engine of 30 hp. is now under test and if this proves reliable the present auxiliary petrol engines will be taken out of the engine cars, the added weight of dropable petrol fuel tanks for these engines and constant speed windmills to supplement them in generating electric power scrapped with still further savings in weight.

The position therefore of both the British ships is at the moment extremely interesting and before the year is over there may be some agreeable surprises in the efficiency and performance realized by the new experimental work in England.

France-Belgium Treaty Near

AMSTERDAM (HOLLAND)—According to recent reports a treaty regarding the joint operation of an airline between Europe and the Congo region is about to be signed by France and Belgium. The Belgian air traffic department has announced that the line is to be inaugurated in April. The route will be operated with Fokker F.VII tri-engined transports, except for the Mediterranean section between Marseilles and Algiers on which seaplanes will be flown. The Fokker is powered with three Titan aircooled engines of 230 hp. each and will accommodate eight passengers, their luggage and a freight load of between 880 and 990 lb.

Foreign Briefs

An airline from Trieste to Zara, Jugoslavia, by way of Fiume, has been inaugurated by the Italian company S.I.S.A., operating three times weekly. Planes take about 13-14 hr. for the complete trip.

A new Hungarian decree reported by representative of the Department of Commerce authorizes the Hungarian Ministry of Commerce to regulate all phases of air traffic, including examination of aircraft and supervision of construction.

Reginald B. B. Colmore, O.B.E., has been promoted from Deputy Director to the position of Director of Airship Development in the British Air Ministry.

The record from Paris to Brussels was recently broken by M. Detroyat in a new Morane-Saulnier pursuit plane with a time of 55 min., averaging 186.5 m.p.h. for the 171 mi.

A new tri-engined Nieuport monoplane is undergoing test flights, and a new tri-engined Farman transport plane has been successfully tested.

The Britannia Trophy for 1929 has been awarded to Lady Bailey for her solo flight from London to South Africa and return.

Conseil Superieur des Transports Aeriens has been created in France under the presidency of Theodore Tissier, with 48 members, to which more will be added later from the flying personnel of transport companies.

A French colonial air squadron will be installed at Tananarive, Madagascar, with photographic survey included in its duties.

French police planes will enforce the rule against flying over forbidden zones in the Saar corridor.

A Japanese airline between Fukuoka and Shanghai is scheduled to be opened in March.

Walter R. Henderson, representative of Stinson Aircraft Co. in China, has returned to the United States on leave. The Ministry of Communications airline between Shanghai and Nanking which was under his supervision has completed 144 flights since it was inaugurated July 8, 1929. Four new Stinson planes have recently been put in service on the line.

A new light plane closed circuit record of 1,750 mi. in 29 hr. is claimed by Renato Donati, Italian aviator.

Budget of the government of Sweden for next year includes an item of 4,000,000 crowns (about $1,000,000) for purchase of aircraft and equipment.

Two new concessions for air mail and passenger service have been granted by the Mexican government. The route between Mexico City and Nuevo Laredo, formerly operated by the government, will be re-opened by a company of which Gen. Eduardo Hay is president. A southeastern service consisting of six short lines out of the city of Villahermosa, state of Chiapas, will be operated by Jose Suarez interests.

The government of Chile has removed the charges made heretofore for inspection of all incoming planes by Department of Sanitation officials, as applied during the daytime. After 6 p.m., and on Sundays and holidays, a charge of $12.50 per plane will be made. New York, Rio & Buenos Aires Line and the French Compagnie Generale Aeropostale are both affected by the new ruling.

Mexican Aviation Co. has installed a second radio set at its Tampico headquarters, so that one may be used for communication with planes, while the other is used for general and business messages. The company now has radio stations at practically all the airports from which it operates.

French Open Line From Syria to Bagdad

PARIS (FRANCE) — Regular service between Syria and Bagdad, operated by the Compagnie Air-Union Lignes d'Orient, was inaugurated Jan. 3. The opening trip was made by M. Guay, who covered the distance in the scheduled time of 5 hr. This route is the prolongation of the Marseilles-Syria line and is to be extended along the Persian coast through India toward Indochina. At present use is made of the Dutch line for the trip between Bangkok and Bagdad.

On Jan. 13, about 4,000 letters from Indochina were delivered in Paris, after leaving Saigon on Jan. 3. By usual means of transit, the time taken is 25 days; the net saving is thus 15 days. The mail was carried as follows: From Saigon to Bangkok, by plane of the Compagnie Air-Asie; from Bangkok to Bagdad (via Rangoon, Calcutta, Allahabad, Karachi, Jask and Basrah), by plane of the Dutch K.L.M. company; from Bagdad to Marseilles (via Athens), by plane of the Compagnie Air Union-Lignes d'Orient, and from Marseilles to Paris, by plane of the Compagnie Air Union.

These experimental trips are to be continued this year. The air transport supplementary rate is fixed at about $.57 per ounce.

THE BUYER'S LOG BOOK

Bowser Strainers

THE aircraft fueling system manufactured by S. F. Bowser and Company, Fort Wayne, Indiana, contains devices for removing foreign matter from gasoline at six different places on its way from the storage tank to the plane. A strainer with a 100 mesh, removable brass screen is

Photograph of Bowser Strainers

installed in the suction line just ahead of the pump to remove sediment, dirt and pipe scale. The fuel passes through the pump into a water separator and is rapidly whirled, throwing foreign matter to the outside where it settles down into a container provided in the bottom.

The next point of protection is at the pit where a strainer similar to the one at the pump is provided. Just before being discharged into the fuel tanks the gasoline passes through another fine mesh screen in the nozzle at the end of the hoze. The nozzle is provided with a cap to prevent the entrance of dirt when taking the hose from the pit to the plane. By the use of float suction the gasoline is always drawn from the upper liquid level, this arrangement being optional.

Formica Aileron Pulleys

TO MEET THE DEMAND for a workable ball bearing aileron pulley for airplanes to reduce friction a line of pulleys has recently been developed by the Formica Insulation Company, Cincinnati, Ohio, in cooperation with the Fafnir Ball Bearing Company, New Britain, Conn. The pulleys are made in the AN 2-3-4 sizes and other standard Fafnir sizes of larger diameter. The familiar type of bakelite with cotton duck base is the material used and the bearing is anchored by solid bakelite. The manufacturer states that the lubricant used will give satisfactory results under temperatures from 150 deg. F. to minus 20 deg. F.

Formica sheet for wainscot or cabin lining is also furnished in a wide range of colors, wood finishes, marble finishes and art moderne patterns. The material comes in high gloss or in satin rubbed finishes. A special padded lining material is furnished which will absorb drumming and other sounds.

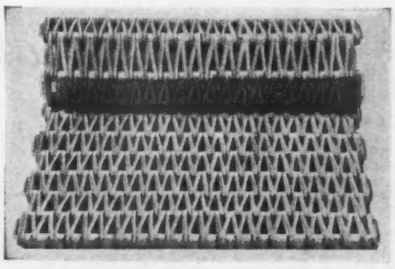
United States Electric Drill

THE UNITED STATES ELECTRICAL TOOL COMPANY, Cincinnati, Ohio, manufactures a general purpose ¼ in. drill operating on direct or alternating current (60 cycles or less) circuits with voltage 10 per cent higher or lower than marked on the name plate. The drill has an aluminum body, a positive make break type switch and S.K.F. ball bearings throughout, with chuck keyless 0 in. to ¼ in. Twelve feet of flexible rubber covered cable with two-piece attachment plug and cable protector are standard equipment.

With a capacity in steel of ¼ in. this tool has a speed under load of 2,000 r.p.m. and weighs 4⅛ lb. It is furnished for 32, 110, 220 and 250 volts.

Safety Mats

SAFETY MATS now being manufactured by the Durable Mat Company, 765 Miami Street, Akron, Ohio, are for use on concrete or other types of hard floors in industrial plants to provide a comfortable surface to stand on and prevent slipping. Constructed of rubber fabric



Standard size "Safety mat"

in straight or herringbone weaves, these mats are made to order in special shapes any length or width. Sizes carried in stock are 17 in. x 25 in., 20 in. x 29 in., 24 in. x 37 in. and 30 in. x 48 in.

TRADE CATALOGS

ELECTRIC TOOLS. Catalog No. 20, most recent publication of the Black & Decker Mfg. Co., Towson, Md., presents a complete line of electric tools for production and maintenance in industry. Special aircraft self-centering pilots and reamers and two types of valve refacers suitable for aircraft are included in the booklet. Other tools illustrated are electric drills, drill stands, hammers, sanders with attachments, hole saws in special assortments and ball bearing bench grinders. A separate price list of tools and accessories is included.

MACHINES FOR SHEET METAL WORKING. The Niagara Machine & Tool Works, Buffalo, N. Y., recently published a bulletin describing the varions types of machinery they manufacture for sheet metal working as applied to aircraft. Among the models included are power squaring shears, power presses, slip roll forming machines, groovers and folders.

American Piston Rings

INCLUDED among the piston rings manufactured by the American Hammered Piston Ring Company, Baltimore, Md. are the compression type, the ventilated oil ring and double vent oil ring. The rings are hammered to give uniform and lasting tension, the turned finish producing a quick and permanent seat. Large slots closely spaced in the latter two types give increased drainage and annular grooves scrape excess oil from the cylinder walls and maintain the necessary oil film, as well as holding sufficient oil to enable easy starting of a cold motor. The double vent ring has two series of parallel slots cut through the ring with rounded corners to give maximum strength. Junk rings for sleeve valve motors are also furnished.

Critchley Reamer

CHADWICK & TREFETHEN, Portsmouth, N. H., are manufacturers of the Critchley expansion reamer in various types. Their line includes five and six angle blade reamers, pilot aligning spiral reamers and piston pin aligning reamers, as well as special sets for garage, radio and general utility. The blades are deeply set, interchangeable and made of semi-high speed steel. All spiral reamers are equipped with a safety device which prevents over expansion.

WHAT OUR *Readers Say*

"Rate Regulation"

TO THE EDITOR:

May I compliment and thank you for your excellent editorial in the January 11th issue of AVIATION entitled "Rate Regulation," particularly that part of it referring to the supposed analogy between aviation and other forms of transportation. It has seemed to me that the leaders in the aviation industry have too often attempted to apply in a three dimensional field theories applicable only to rigid traction and surface transportation.

It has also been a pleasure to read Mr. Holme's article on the airport problem in New York City, having served as a member of the Fact-Finding Committee in 1927, and of its sub-committee on locations.

JOHN DWIGHT SULLIVAN,
New York City.

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Aviation Business Men

TO THE EDITOR:

Your editorial entitled "Salesmen not Pilots" has been published at a most opportune time, and diversified comment should prove valuable to the industry. The establishing of an airplane sales organization with the proper kind of personnel is important. More important is the executive personnel who must take the initiative to develop and direct the policies of the airplane sales department.

I believe, Mr. Editor, that you can do the industry an immense amount of good if you will through your magazine continue to impress upon the industry the imperative need for business men in aviation, to insure dividends to those who have invested in the future of the aviation.

We must divorce ourselves from the idea that the aviation industry is an industry of the air for it is not. Actual flying constitutes approximately ten per cent of the activity. More and more every day we learn that flying is only the end result of a huge ground activity.

Over a year ago Universal Aviation Schools anticipated the need for business men in aviation, and, in an effort to alleviate this condition, offered what is believed to be the first Aviation Business Administration Course in the country. This course was designed to fill an important economic need for the furtherance of an efficient business-like management in aviation. I believe that the type of instruction offered by this Business Course gives an ideal preparatory training for an airplane salesman.

Classes are conducted in the evening. Ten weeks are required for completion of the course, which includes a lecture and inspection tour of factories, and airports, and observation tours of mail, passenger, service, and school hangars. Lectures are delivered with the aid of electric projection machines for illustrating.

The course covers: Airplane sales, finance plans, types and makes; aviation financing, organization structure, advertising, accounting, insurance and law; aircraft operations, including air-mail, passengers, express traffic solicitation, tickets, tariffs, schedules, and Air Commerce rules and regulations; applied aeronautics, navigation, meteorology, instruments, radio, and aerial photography. To make a course of this kind practical and valuable to the industry we have secured as instructors the executives and department heads of our Company; also, aviation lawyers, airport engineers, insurance experts, and university professors.

A careful analysis of the types of students enrolled in the course reveals that over half of the students are taking the course for the definite purpose of applying previous business experience to similar work in aviation. These students have been enlisted chiefly from such professions and occupations as sales, accounting, insurance, law, traffic, and engineering. If more of this type of personnel can be drafted, aviation will, I believe, become quickly established on a firm and economic business basis; and, in so doing, the least amount of effort and time will be lost during this formative period of business organization.

Our employment manager has informed me that the greatest demand in aviation at present is for men to fill business positions; that the majority of positions in the large air transport companies are held by men who are neither actively engaged as pilots nor mechanics; and, further, that the need for business men is increasing. The fact is: Aviation is a business and must be recognized as such. It is not my purpose to discount the necessity for engineers, pilots and mechanics. The man who has a practical and technical background coupled with business experience is an ideal combination for aviation's future. Experience has shown us that it is easier to train a man in the rudiments of flying than to teach a pilot the laws and principles of business administration. And, so it is with airplane salesmen. For every demonstration airplane salesman there will be a large well organized ground crew similar in many ways to the sales organization and personnel of the automobile business. The ground crew salesmen should above all have sales experience and ability to personally sell the business man who should be in the market.

I have, Mr. Editor in presenting this, made an effort to point out what has been done in the educational field to encourage and properly prepare men for the industry. The Government encourages, promotes and safeguards the future progress of aviation by regulating, inspecting and licensing pilots, mechanics, and aircraft. But, aviation organization, management and personnel is, I believe, years behind of the remarkable advancement made in these other phases of the industry.

ALEX. M. ROBSON
Supervisor of Universal Aviation Business Courses

Editorial Comment
FROM THE DAILY PRESS

Stunt Flying Over New York

THE PROJECT which has just been announced for tomorrow, whereby a plane will fly repeatedly over No. 120 Wall Street and pick up bags by means of a new catapult device, one of them containing mail, is dangerous and should be prohibited. It is necessary only to recall the recent catastrophe near Central Park to realize what low flying over New York can result in; with thousands of people standing around to see something that has been heralded in advance, a crash could cause a veritable catastrophe. There can be no excuse for to-morrow's program, no matter what idea lies back of it. If it is merely an isolated stunt, undertaken to advertise the plane, the flyers, the catapult or the building, it is too trifling to justify the risk that

it sets up. If it looks toward collection of mail in this manner as a regular thing in the future, it is starting something that must sooner or lated end in disaster. The police should take whatever action is necessary to see that the plan is blocked.

—NEW YORK "WORLD."

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Air Fares

THE FIRST REAL BASIS for comparison of air transportation with rail is in sight with the announcement by several air transport companies that fares have been reduced to that of train fares plus the Pullman charge. . . .

It is realized that safety has been one of the big factors holding back such transportation and the other big one has been the cost. The average person could not afford to travel by plane. There has been a question whether air transport companies could afford to carry passengers at rail rates. If they can the railroads must add airplanes as competitors for swift and long hauls as they have had to add highway transportation as a competitor for the short hauls.

Railroad consolidation apparently must not only take into consideration a regrouping of rail lines but it also must consider transportation companies as providing a choice of either road, rail or air facilities. That seems to be the ultimate outcome of the transportation problem.

—DECATUR (ILL.) REVIEW.

New Volumes
FOR THE SHELVES

Legal Problems of the Air

AIR LAW REVIEW, *Vol. 1, No. 1, Jan. 1930. Edited by Alison Reppy; published quarterly by the Board of Air Law Review of New York University School of Law. Price, $5.00 per Annum, $1.50 per issue. Editorial Offices, Washington Square East, New York, N. Y.*

WITH THE OBJECT of reviewing and discussing all legal problems connected with aviation and radio, the *Air Law Review* has been inaugurated under the auspices of New York University. It is also the official journal of the American Section of the International Committee on Wireless Telegraphy. In addition to publishing, in each quarterly issue, a number of articles on legal and legislative subjects in these two fields, the magazine will reprint important addresses on related subjects which have been given in the interim between issues, and will also contain comments on "The Progress of Air Law," "Notes" on relevant legal questions, a summary on important "Decisions" establishing precedents, and "Book Reviews," in specific sections under these headings.

The material in the first issue, quite properly and naturally, consists largely of summary and comment on the legal situation of the air at the present time, nationally and internationally. Clement L. Bouvé, writing on "The Development of International Rules of Conduct in Air Navigation," gives at length precedent and instances of general acceptance of the principle that each nation has complete jurisdiction over the air above its territory. This principle, resting at first upon somewhat far-fetched analogies, was widely asserted during the War, and definitely stated in the "Convention for the Regulation of Aerial Navigation" which was drawn up in connection with the Peace Conference, at Paris in 1919. It was reaffirmed both by the Spanish-American Congress of Aerial Navigation at Madrid in 1926, and by the Convention drawn up by a Pan-American Congress at Havana in 1928.

Accordingly, as Mr. Bouvé points out, "innocent passage" of an aircraft belonging to one country over the territory of another is a privilege to be obtained by International agreement, and not a right comparable to the freedom of the seas. Following the specific reasons for this conclusion, the author goes over the provisions of the Paris and Havana Conventions in considerable detail, interpreting them as they establish the present international legal status of and restrictions pertaining to aircraft.

Another article of importance is "State Regulation of Aircraft Common Carriers," which is in substance a chapter from the forthcoming book on "Aeronautical Law" by W. Jefferson Davis, member of the committee on aeronautical law of the American Bar Association. The author is very careful to avoid definite conclusions or recommendations; but while he points out that an ordinary aerial taxi or sightseeing company probably does not have the status of common carrier, he says that most aerial transportation companies may be construed as such at the discretion of various state or federal commissions. In California, Pennsylvania, and Arizona, this construction of the state constitutions and laws has already been made, though the commissions involved have shown some reluctance to extend their authority beyond a somewhat perfunctory acceptance of jurisdiction. Similarly, the Interstate Commerce Commission has shown no disposition to take up the question of aerial transport unless specifically instructed to do so by Congress.

As a result of this situation, in the opinion of Mr. Davis, there is too little regulation at present; but there is also entirely too much proposed regulation. Control by the Department of Commerce seems rather satisfactory in practise, but raises legal difficulties. For example, he questions the constitutionality of the laws adopted by a number of states which require conformity with Department of Commerce licensing regulations, and points out that the Department of Commerce cannot accept the responsibility for construing, interpreting or judicially defining its own rules. In conclusion, Mr. Davis confines himself to remarking that the creation of an Interstate Air Commerce Commission has been suggested as a possible solution of the problems involved.

The excellent "Survey of State Aeronautical Legislation, 1928-29, compiled by Harry J. Freeman of the New York University School of Law for the Aeronautical Chamber of Commerce, and already made public in part by that body, is here reprinted in full. The total of 314 bills introduced during this period, 182 of which were enacted, is sufficient indication of the confusion which is certain to result unless unification is secured either by co-operation between states or by federal action. Mr. Freeman makes little attempt at comment, contenting himself with a careful summary of the general nature of bills introduced, together with lists of states which adopted certain types of regulations.

Three papers are reprinted in the section entitled "From the Platform." Speaking on "Development of Aviation Laws in the United States," before the 1929 annual meeting of the New York State Bar Association, Chester W. Cuthell presented a careful general summary of the legal attitude toward aircraft and operating companies, concluding with the expression of a definite hope that the aviation industry would be allowed to develop without too much legal restriction.

In "The Nature of the Right of Flight," an address delivered before the Committee on Aeronautical Law of the American Bar Association, George B. Logan gave a history of laws and decisions relative to the ownership and use of the air by aircraft within national boundaries. Most important was his statement that neither courts nor legislation had ever sustained the theoretical ownership of the air above by an owner of land, except as it is actually used for build-

ings and other structures. Under some circumstances, however, landowners may have a case against operators of aircraft in their vicinity on the grounds that the aircraft constitute a nuisance. Mr. Logan also discusses the question of liability for damage by aircraft; and he points out that under some circumstances this liability may even extend to airport operators. The whole subject, he believes, is in great need of clarification, but he favors clarification by court decision and precedent, in most cases, rather than by legislation.

The third speech reprinted is the paper on "Unification of Communications Services" presented by Owen D. Young before the Interstate Commerce Committee of the United States Senate. Louis G. Caldwell also contributes an article to this number of the *Air Law Review* on the subject of "Radio Legislation Pending Before Congress."

The notes on the progress of air law, and on recent important decisions, as well as the extensive general summary of legal decisions relative to the status and responsibilities of aircraft operators, naturally cannot be summarized in a review of this kind. Their value and importance to the industry, however, are obvious; and the tabloid form of their presentation offers an excellent combination of clarity and brevity. In the back of the magazine there is a check-list of dates and reference numbers of all state laws pertaining to aeronautics enacted in 1928-29, prepared by Mr. Freeman, together with a list of current legal literature on the subject, in periodicals, monographs, and books.
—CHARLES E. NOYES, *Assistant Editor of* AVIATION.

Abstracts AND *Reviews*

Control of Fokker F.VII

THE CONTROL OF THE FOKKER F. VII-3M AEROPLANE; *Interim Report by the Stability and Control Panel, With an Appendix Giving Precis of Pilot's Reports; British Aero Research Committee, R. & M. No. 1236.*

AMERICAN PILOTS familiar with the Fokker F. 711 will find this summary of the reports of British pilots upon its control characteristics of considerable interest.

In normal flight, the stability of the Fokker F. VII was found to be nearly neutral both fore and aft and laterally, whilst the controls were light and well balanced in respect of the relative effort required to move each control. The majority of the pilots commented upon the fact that it was easy to keep the machine straight by the use of the rudder when one wing engine was cut out, but that the rudder control was insufficient in slow flight, as shortly before the stall was reached.

Wind tunnel experiments upon the action of the ailerons and the moments acting upon the wing when rolling and sideslipping were in agreement with the pilots' reports that, when stalled, the F. VII was subject to the same dangers present in conventional British aeroplanes. The tunnel tests suggested that although control was no less inadequate than on other machines, once a serious roll or yaw had commenced, it might be easier to fly the Fokker stalled as long as it was on an even keel. This same characteristic was observed to exist in a Bristol Fighter fitted with slots and slot control.

The feature in which the Fokker differed most markedly from conventional British biplanes was in the thick, high lift wing which caused the nose to be higher in a stalled glide than is the case with other machines. The attitude of the aeroplane thus gave an earlier warning of the stall than is usual, a feature which may be valuable for the prevention of accidental stalls.

• • •

Directional Beacons

COMMENT ON OBTIENT LE GUIDAGE SANS CABLE; *by William Loth; article in* L'Air, *Nov. 15, 1929.*

THE PRINCIPLE of establishing a route by two rotating beacons, as developed by William Loth, is in itself quite simple. The rotation of the beacons is carefully synchronized, and the correct route will be along the line on which the beams meet. A pilot receiving one beam before the other will know instantly that he is off course, and by a differentiation of the two beams he can tell immediately which direction and how much.

These beams, Mr. Loth explains, may be radio, sound, or light; but radio is generally preferred because of its usability over greater distances. In the simplest system, two widely separated transmitting stations are controlled from a central point, so that the rotation of both beacons can be governed by a single electrical mechanism.

The rotation of beacons, for purposes of identification, is by jerks rather than constant, and the ordinary method of control is by means of a perforated strip, making and interrupting electrical contact, moved by a constant speed motor. When it is not possible to establish a central control station, it has been found that the beacons can be satisfactorily synchronized by chronometer. The central control, however, has the added advantage of simplicity of operation when it is found advisable to change the indicated course, because of weather reports, etc. If the control is separate, orders must be issued and changes made at both points, while with a central control all that is necessary is a change in the perforated strip.

• • •

Measuring Records

MEASURING WORLD FLYING RECORDS; *by Prof. Dr. H. Everling; two-part article in* Aeronautica, *Sept.-Nov, 1929.*

REGULATIONS for the measurement of the world's records promulgated by the Federation Aeronautique Internationale in several cases require an accuracy much greater than the unavoidable probable error, and in other cases fail to take all the proper items into consideration, in the opinion of Dr. Everling. He presents a number of specific criticisms of the rules governing measurement of distance, endurance, speed, and altitude.

Correction of distance measurements over 50 km. for curvature of the earth's surface on the basis of a radius of 6,371.227 km. is, in the author's opinion, essentially absurd, because the radius varies 21.32 km. between the equator and the poles. Dr. Everling also feels that this curvature need not be taken into account for distances less than 637 km., in which case it amounts to only about ¼ km., considerably less than the variation in the actual distance of the plane's travel due to changes in altitude, course, etc. Further, since distance records must be exceeded by 100 km., it seems unnecessary to require measurement of the distance with an exactness greater than 1 km. At present, the measurement is presumably accurate to one meter.

In the measurement of endurance records, the author does not object to the margins fixed, but suggests that for a time of more than 12 hr., measurement within 1 min. is sufficient, and there is little reason to demand a first class chronometer, which is sometimes difficult to procure. In judging speed records, Dr. Everling assumes that the probable error of the umpires will be at least 0.1 sec., which would amount to 5 km. per hr. over the established 3-km. course. He recommends that the course should be longer, and that the old record should be broken by more than the 8 km. per hr. now required, before a new record is allowed. Further, the altitude should be checked more accurately, as a pilot can gain 5 km. per hr. by losing only 5 m. in altitude. Finally, the author feels that in view of these inaccuracies, it is absurd to state the record except in terms of whole kilometers per hour.

The author's most serious criticism concerns the measurement of altitude. He admits that altitude records at present are an indication of human rather than machine endurance, and that it is therefore proper to measure the condition of the atmosphere reached, as shown by a barograph, rather than the actual height above sea-level. However, he feels that the present method of calculation is in error because it fails to consider temperature in the air, though the barograph must remain in the plane 24 hr. after the record is made and be removed at a temperature of 15 deg. C. Dr. Everling says that this is avoiding a possible error of ½ mm. (column of mercury), while neglecting a possible error of 2 mm. The place of installation of the barograph on the plane may also result in variations which will make a difference of as much as 80 m. in the apparent altitude attained, due to suction or pressure effects resulting from the speed of the plane.

In conclusion, Dr. Everling suggests that the margin by which a record must be exceeded should be expressed as a fraction of the record itself, rather than as an exact quantity; that it should be equal to ten times the estimated possible errors of measurement; and that the record itself should not be written with so many decimal places that more than the last one is uncertain on the basis of probable error.

• • •

Loads on Dive Recovery

LOADS ON THE MAIN PLANES AND TAIL OF AN AEROPLANE WHEN RECOVERING FROM A DIVE; *By H. Bolas and G. A. Allward; British Aero. Research Committee, R. & M. No. 1229.*

THE LOADS imposed upon the wings and tail of an airplane when pulling out of a dive were calculated mathematically, the effect of certain variables being studied thereby. The quantities varied were the gear ratio between control stick and elevators, the time to pull back on the stick, the load applied to the stick, and the diving speed of the airplane. The results were illustrated by curves of the variables plotted against the loads imposed.

The loads varied little with changes of the gear ratio. A very low gear might eliminate the high loads, but a large hand load could not be applied in that case. Increasing the time to pull back from 0.2 to 3.0 seconds reduced the tail loads by more than three-quarters and the wing loads by a much smaller amount. The greatest reduction of both the wing and tail loads resulted from a reduction of the loads applied to the control column, and indicated that failures when pulling out of dives could largely be prevented by limiting the control load which can be transmitted to the elevators. It was shown that such a reduction of hand loads did not unduly increase the loss of altitude required to flatten out. Increasing the load factors was proved to be out of the question as a means of eliminating failure since a loading as high as 13½g. could be obtained by diving the ship at its terminal velocity and applying a hand load of 150 lb. to the control stick in 0.2 seconds.

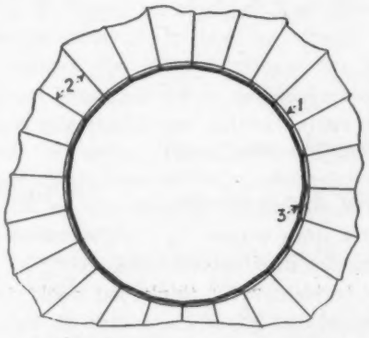
The pull of 150 lbs. applied in ½ second was experimentally determined as a value not too high to be exerted by a normal pilot.

New Patents

Parachute

1,743,951. PARACHUTE. LUIGI AVORIO, Rome, Italy. Filed Dec. 11, 1928, Serial No. 325,252, and in Italy Dec. 23, 1927. 2 Claims. (Cl. 244—1.)

INSTEAD OF enclosing an elastic in the edge of the usual vent in the top of a parachute, the elastic is here supported independently of the vent



The illustration shows vent periphery 1, suspension cords 2, and free elastic 3.

periphery, and the upper ends of the suspension cords are connected to the free elastic.

• • •

Safety Device

1,737,951. AEROPLANE. STRAWTHER SISSON, Hazel, Ky. Filed Sept. 15, 1927. Serial No. 219,692. 7 Claims. (Cl. 244—21.)

IN ORDER to enable an airplane to right itself after it starts a nose-dive, this device proposes to swing up, by means of a spring, all of the fuselage to the rear of the wing to a position approximately at right angles to the rest of the body, and to provide forward and rearward extensions on the wing. These extensions are spring-operated and are packed on top of the wing when not in use. A pendulum is suspended within the fuselage so that when a nose-dive takes place the pendulum will swing with respect to the airplane. This relative movement between the pendulum and airplane is designed to operate latches to release the wing extensions and the tail portion of the fuselage.

Airplane with Pivoted Wings

1,740,016. AEROPLANE. JERRY HÜBSCHMANN, Great Neck, N. Y. Filed Oct. 27, 1927. Serial No. 229,192. 2 Claims. (Cl. 244—29.)

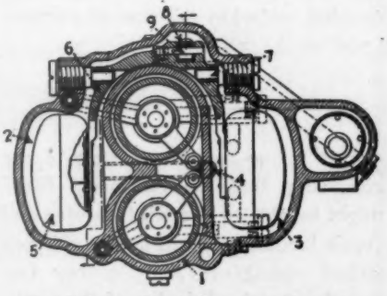
THE WINGS of an airplane are pivoted on vertical axes so that they move in forward and rearward directions. For simultaneously operating both wings about their pivots there is provided a hand-wheel and gear connections in the drive between each wing and the hand wheel. One of the gear connections includes a reversing means designed to be operated by moving the wheel toward or away from the pilot to enable him to swing both wings in the same direction or in opposite directions.

• • •

Airplane Engine Carburetor

1,743,791. AIRPLANE CARBURETOR. FRANK C. MOCK, Chicago, Ill., assignor to Stromberg Motor Devices Co., Chicago, Ill., a Corporation of Illinois. Original application filed Jan. 16, 1924, Serial No. 686,474. Divided and this application filed Mar. 18, 1926. Serial No. 95,516. 7 Claims. (Cl. 261—70.)

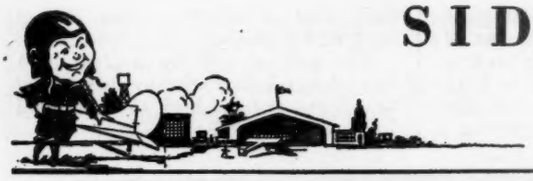
TWO CARBURETOR chambers are arranged side by side within a casing. Float chambers, joined by a tube, are formed at the front and rear of



The illustration shows carburetor chambers 1, float chambers 2, 3, tube 4, floats 5, yoke 6 pivoted at 7, and fuel inlet valve stem 8 pivoted on the yoke at 9.

the carburetor chambers. The floats are rigidly joined together by a yoke pivoted in the casing. The yoke is connected to the fuel inlet valve for the purpose of opening the fuel valve when the floats descend.

SIDE SLIPS



By
Robert R. Osborn

MR. M.B.N. of Oneida, N. Y., sends in an interesting newspaper clipping from the Syracuse Herald, describing an accident in which Robert Black and Ray Rothman "escape death in a 1,000-mile glide to Roosevelt Field, L. I."

We suppose the death they escaped would have been caused by starvation. Mr. M.B.N. suggests that the Society for the Aeronautical Education of Newspaper Reporters offer a $50,000 prize for the first newspaper writer who glides from New York to Paris. If anyone cares to offer such a prize through the Society, we shall be glad to take care of the competition, provided there is an additional $50,000 fund allowed for administration.

• • •

It seems that the new autogiros are not only unusual ships themselves but are going to provide us with some new flying thrills and new maneuvers when they make their appearances on the flying fields of the country,—judging by the newspaper clipping sent in by B.H.S. of Dorchester, Mass. "When the motor is shut off and the tail is dropped by a sudden manipulation of the rudder, the autogiro begins that dreaded backward fall that all aviators know as the tail spin."

• • •

Just as we had about come to the conclusion that the California flyers might be able to overhaul engines and repair landing gears in flight, still they lacked courage to reply to our frequently expressed doubts of the truthfulness of the most of the aeronautical news from that section, the following letter and a clipping came in from C. F. McR. of Los Angeles:

The clipping is from Denver and says: "Scores of the nation's greatest civilian and military pilots with the pick of American manufactured ships will compete for $5,000 cash prizes and macmfwyp vbg vbg vbaa," and the accompanying letter follows:

"Perhaps you can help me. I've been watching the newspapers and the news columns of AVIATION since October, 1929, hoping to learn who won the "macmfwyp vbg vbg vbaa," but there has been no further information printed concerning this outstanding prize. You know everything (Author's note: Granted) and I am sure can check up on this matter. Certainly it is a thing of the most vital interest to the entire world of aviation and I have no doubt will be competed for in all of the future meets of any importance. The only explanation which has as yet suggested itself to me is that this "macmfwyp vbg vbg vbaa" is the award going to the aviator who wins the contest for the first man to boil an egg over an electric stove carried in a plane contesting for the inverted flight record.

Incidentally, I think you ought to know that all of these raps at California aviators are uncalled for. California aviators were the first to change a wheel, engine, or pair of pants—in mid-air—and I think should be given full credit. The first mid-air change from pants to pants was accomplished on New Year's Eve by Waldo Waterman, E.B., Q.B., Q.T. E.T.C., who went up for a short spin with his friend Art Goebel, Goebel being at the "wheel" of plane during the change. This remarkable change was accomplished without damage to either plane or pants, but the aviators were entirely modest about their accomplishment on landing. One needs only to consider the possibility of a forced landing in the midst of the change to realize the accompanying danger.

Moreover, our night flyers have put one over on you easterners by setting a new world's record for night formation flying with lighted electric signs. Three planes were seen cruising above the city all New Year's Eve, each plane being equipped with a fiery red sign advertising a well known make of gasoline. Quite cleverly, the pilots of the three planes would so maneuver as to cause the three signs to alternately merge or multiply to two or three. Then by rolling in unison to inverted flight a weird effect was obtained by casting the reflection of the signs upon a layer of clouds beneath which the planes were cruising. The most remarkable part of this new enterprise in aerial advertising, is that considerable economy is effected by equipping the central plane only of the formation with a generator for the sign current, running auxiliary power lines to each wing plane of the formation and thus reducing by two the number of generating units required."

• • •

Now we know why we haven't heard from the California flyers before—they were saving up to put their complaints all in one letter.

• • •

While we were talking to a young lady the other day, she pointed out the one serious drawback to all of these mechanical pilots and robot aviators which had not occurred to us before. "They will never be a success" she said, "unless they can be designed to look stunning in whipcord breeches, leather coat, riding boots, helmet and goggles."

• • •

We see that one of the air lines is advertising that their ships are equipped with "upholstered chairs with reclining backs that retain their comfort throughout the flights." Somehow this reminds us of the dentist who gaily remarks as he pushes his drill into a tender spot, "Surely, I'm a painless dentist,—this isn't hurting me a bit."

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Curtiss Aeroplane and Motor Company
Curtiss-Robertson Airplane Mfg. Company
Douglas Aircraft Company, Inc.
Fairchild Airplane Mfg. Corp.
General Airplanes Corporation
Keystone Aircraft Corporation
Kreider-Reisner Aircraft Company, Inc.
Joseph Kreutzer Corporation
E. M. Laird Airplane Company
Lockheed Aircraft Company
Mahoney-Ryan Aircraft Corporation
The Glenn L. Martin Company
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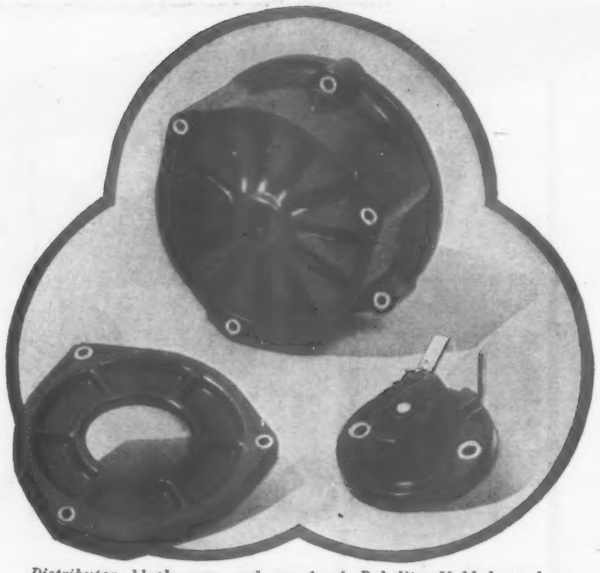

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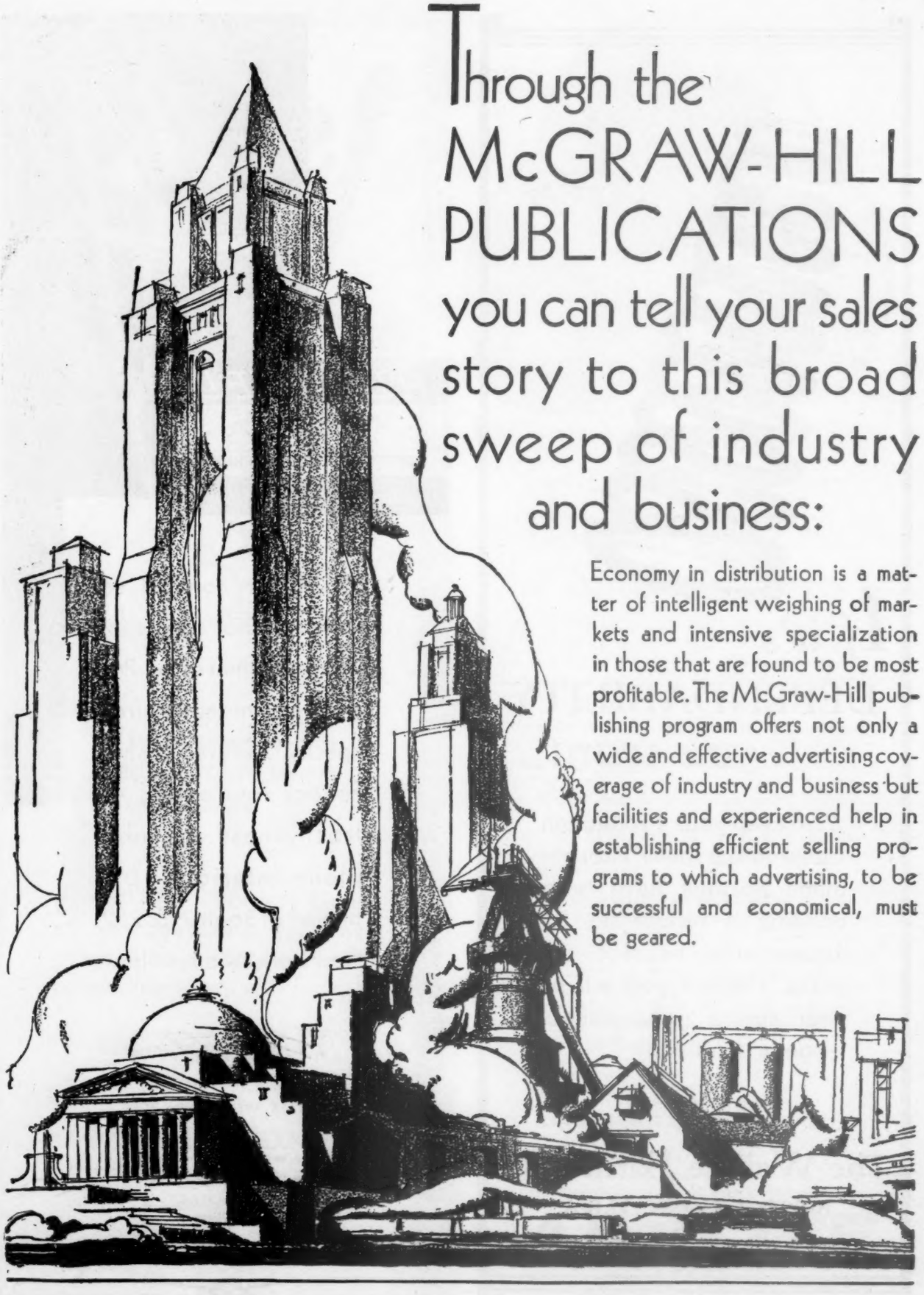

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CONSTRUCTION METHODS—A monthly pictorial of field practice and equipment read by the field-minded construction men. Covers construction, maintenance and material handling methods for general construction, highways, buildings, industrial plants, public works and utilities. Circulation 32,000.**

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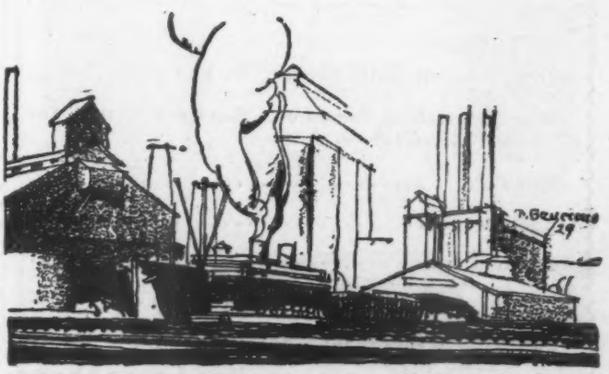

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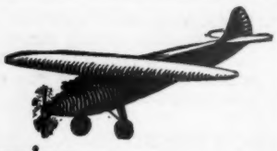

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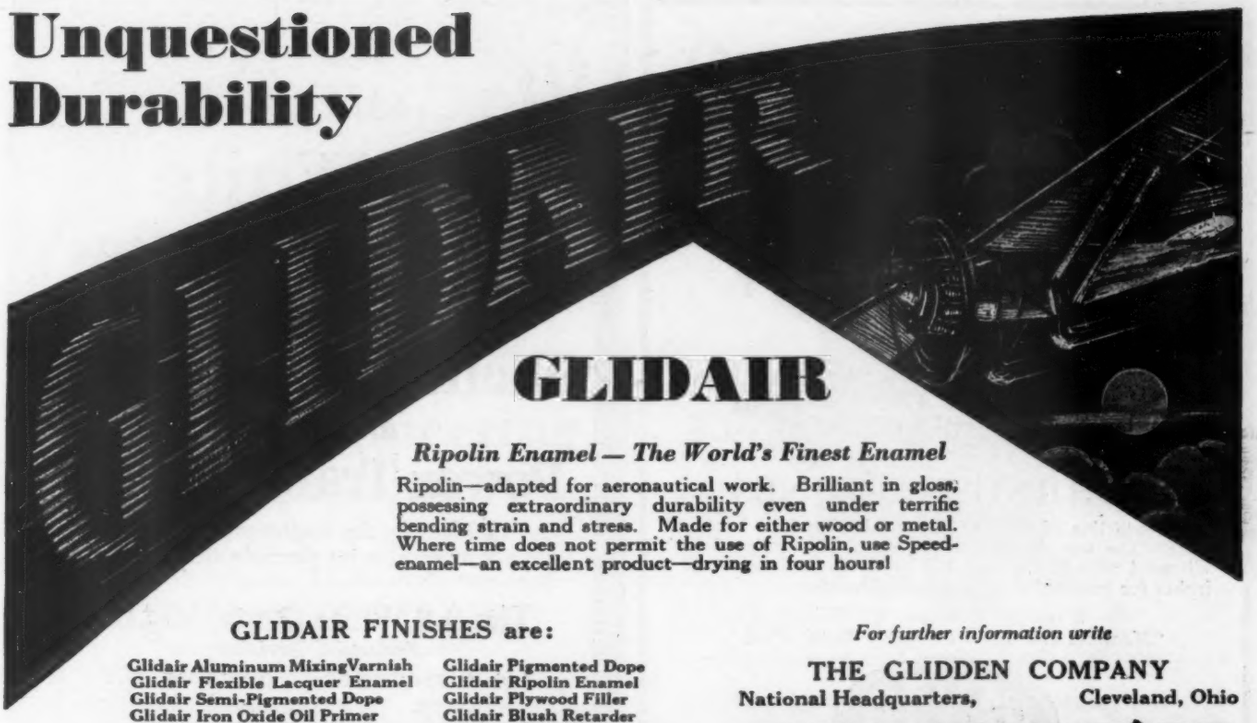

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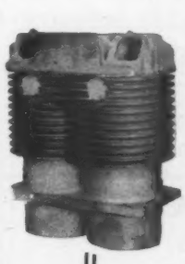

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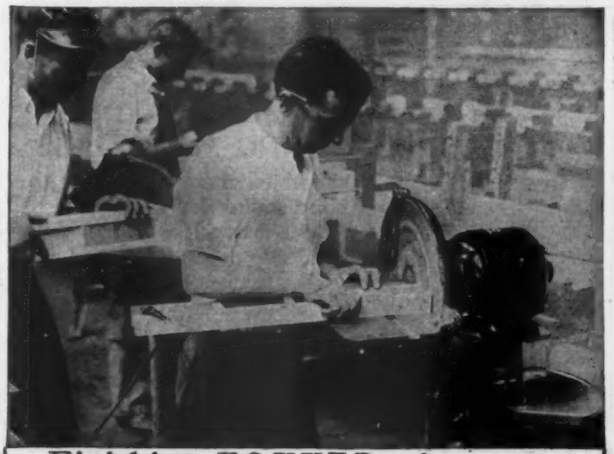

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Other spaces and contract rates on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

FOR SALE

FOR SALE: Wright J-6, 165 hp. Waco. Flown 40 hours, same as new. Blue fuselage with Vesta yellow wings and tail group. Priced to sell. Ross Becker, Jackson, Mich.

AIRPLANE for sale $275, practically brand new, less motor; built by an airplane factory, made very strong and flies very good. Don't buy anything until you get the dope on this buy. Also 1 American Eagle with rebuilt OX-5 motor, priced right. L. H. Dierking, 457 Orange St., Elgin, Ill.

AMERICAN Eagle, with 10 cylinder Anzani, one year old, perfect fly-away condition, $1,500; must sell; will take automobile as part payment. John Herfurtuer, 453 Willoughby Ave., Brooklyn, N. Y. Tel. Williamsburg 3810.

ATTENTION airports! Ryan Brougham, J-5, good shape, licensed. For sale by owner. Ideal for passenger work. Will earn real money. Must sell quick, $2,000 cut from former price. First $3,750 takes it. Bernard Lee, 309 G St., San Diego, Calif.

BUHL J-4 three place Bi-plane excellent condition, licensed, blind flying equipment, always kept in hanger. Worth five thousand dollars, will sacrifice for $2700. Wire C. J. Bristow, Chicago Heights, Ill.

FOR SALE

FOR SALE: Waco 10, newly licensed, good condition throughout. A real buy, $1,400. Also Swallow, newly licensed, perfect condition, $1,500. Becker & Forner Flying Service, Jackson, Mich.

FOR SALE: Brand new Standard trainer, Kinner motor, never used. Also four-passenger new Standard J-5 Wright motor, both guaranteed and government licensed. Box 132, Hamden, Conn.

FOR SALE: OX-5, OXX-6 and Hisso engines. Write for complete description. Heckman Machine Works, 4026 Lake Street, Chicago, Illinois.

FOR SALE: One Hisso, A Swallow, new, never cracked up, many extras, sacrifice. One OX-5 Swallow training plane, excellent condition. One new Swallow TP with Kinner motor. These ships are in first-class condition and priced to sell. Wire or write Hoch Aviation Company, Butler, Pa.

FOR SALE: Swallow, OX-5, 3-place, 150 hours, good condition, any reasonable offer. Chadbourne, Ridgewood, N. J. Phone 3780.

FOR SALE

FOR SALE: One tapered wing Waco, powered with Wright J-6 300, with electric starter, Hamilton metal propeller, air speed indicator, turn and bank, and rate of climb indicator, compass and other standard instruments. Ship practically new, in perfect condition. Motor has had 65 hours and is in perfect order. A bargain at $8,000. Lee Saunders, c/o Clarence Saunders, Inc., Memphis Tenn.

FOR SALE: Travel Air OX-5, 75 hours, practically new, 6 months old, Bank and Pitch compass, light, etc. Privately owned, always in hangar. Write or wire R. L. Rouch, 3560 Pape Ave., Cincinnati, Ohio.

FOR SALE: One OX-5 motor, completely rebuilt, new guides, exhaust valve sets, rings, and valve action repinned, Berling mag. and new wires, 1,400 r.p.m. guaranteed. $360 cash. Clif. Wagner, R., No. 2, Box 55, Cleveland, Wisconsin.

FOR SALE: Hangar, Hisso motors, steel fuselage, used parts, as is. Filling station. Lunchroom furnished. Must sell at a sacrifice on account of illness of manager. Miami Aircraft Company, Miami, Oklahoma.

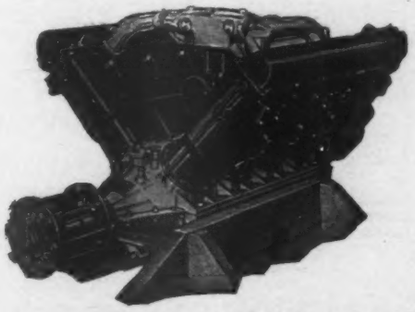
NEW WHEELS

	Others ask	My price
26x4 in.	$17.50	$ 7.50
28x3 in.		7.50
28x4 in.	40.00	15.00
28x4 in. disc covered	45.00	15.00
36x8 in.	67.50	20.00

AIR COOLED MOTORS

Lawrence 28 hp.	$ 125.00
Wasp	1650.00
Anzani 35 hp.	350.00
Anzani 60 hp., new	700.00
Anzani 80 hp., new	800.00
Anzani 110 hp., new	1050.00
Szekely 40 hp., new	600.00
Velie 55 hp., new	800.00
Renault 88 hp., new, Vee type	350.00
Siemens Halske, 55 hp.	525.00

A VERY SPECIAL OFFER



GUARANTEED Overhauled Hispano-Suiza $390.00

Model E, overhauled	$600.00
Model H, 300 hp., new	375.00
Model H, 300 hp., used	225.00
Liberty, used	210.00
Curtiss OXX-6,	$290.00, $390.00 and 440.00
Curtiss OX-5	$190.00, $290.00 and 590.00
180 hp., French Hisso, new	550.00

AIRPLANES

Aeromarine 39-B, new, less engine	$ 800.00
Aeromarine 39-B, reconditioned, Model E	1400.00
DeHaviland 6, reconditioned OXX-6	900.00

KARL ORT
YORK, PA.

NEW CARBURETORS

	Others ask	My price
Stromberg for Wasp	$275	$125
Zenith 06D-s, Curtiss	50	25
Zenith for Hispano-A	50	25
Stromberg for Wright-H or H-3	175	85

SCHOOL MOTORS

Incomplete or unairworthy

Wright J4	$375.00
Warner	350.00
Wright Model H	160.00
Liberty, Unassembled	150.00
Szekely	225.00
Velie	350.00
OXX-6	125.00
30 and 45 hp., Anzanies	150.00

FOR SALE

FOR SALE: Curtiss Seagull, C-6 motor completely overhauled, wings recovered, hull refinished. Metal prop. Ship like new. Will sacrifice for quick sale. Ship now stored at North Beach, L. I. Address D. W. Flying Service, Inc., LeRoy, N. Y.

FOR SALE: Salmson 9-cylinder, 230 hp, radial water cooled engines and parts, model Z-9. Complete engines as low as $200. Menasco Motors, Inc., 6718 McKinley Ave., Los Angeles, Calif.

FOR SALE: Hisso E, perfect condition, complete with motormount, cowling and propeller. Make offer. FS-423, Aviation, Tenth Ave. at 36th Street, New York City.

HISSO-A-2 motors, $500 each. Complete in all details including hub. We offer 4 Hisso 150 h.p. dry sump motors in condition equal to new. They have been completely rebuilt and refinished. All have had less than 50 hours total use. These motors are absolutely A No. 1 and will be demonstrated on test block at Springfield if purchaser desires. The Little Greiner Flying Service, Inc., Municipal Airport, Springfield, Ohio.

J-5, WHIRLWIND Waco for sale. New less than three months ago. Standard steel propeller, new trypod type undercarriage, nickel chromed struts, and exhaust stacks, Bendix heel brakes, and Haywood air starter. A real performing ship, and is priced to sell. E. A. Forner, Jackson, Mich.

PARACHUTES, new and used, rope ladders for stunt men, etc. Specify weight. Thompson Bros. Balloon and Parachute Co., Aurora, Illinois. Established 1903.

Detroit Aero Motors Co.
5055-59 Townsend Ave., Detroit, Mich.

MOTORS FOR SALE:

1—J-6, Nine Wright Whirlwind.
2—J-5 Wright Whirlwinds.
1—Kinner.
2—Warner Scarab.
1—Velie, sixty.
1—Model E Hispano.
1—Model A Hispano
2—H-3 Hispano.
1—OXX-6 Curtiss.
4—OX-5 Curtiss.
1—110-hp. Anzani.
1—45-hp. Anzani.

Write for information and prices.

GOOD USED PLANES
FOR SALE AT
Half The Price
They Will Sell For Next Spring

Fairchild Cabin 5 Place. J-5 Motor. Completely Rebuilt, Repainted and Recovered. Many extras, which include Pontoons, Beaching gear, Anchor Rope and Struts. License No. N.C. 1521. Price $6,500*. Less Pontoons. Price $5,000*.
Waco 10 3 Place. J-5 Motor. Completely Rebuilt, Repainted, Recovered. Many Extras, which include Night Flying Equipment. License No. N.C. 7445. Price $4,500*.
Spartan C-3 Biplane. Walter 135 HP. Motor. Special Paint Job. Practically New upholstered cock pits. Many Extras which include Turn and Bank Indicator, Air Speed, Compass, Navigation Lights, Luggage Compartment. (Cost new, $6,100). License No. N.C. 8066. Price $3,500*.
Waco 10. OX5 Motor. Completely Rebuilt. Recovered and Repainted. Special Sport Color Combination. Miller Valve action. Many extras. License No. N.C. 1066. Price $1,800*
Waco 10. OX5 Motor. Special Color. License No. N.C. 7517. Price $1,700*.
Waco 10. OX5 Motor. Standard Color. Green Fuselage, Silver Wings. License No. N.C. 7516. Price $1,600*.
*Note. All prices quoted Philadelphia.

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Ludington Phila. Flying Service, Inc.
Operating from
Philadelphia Airport — Central Airport
Island Rd. & Tinicum Ave. — Camden, N. J.
Woodland 1060 — Camden 8060

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NEW Super Heath Parasol, welded fuselage and empannage built by Heath factory. Wings and fuselage uncovered and can be readily inspected: $250 takes ship. E. J. Stewart, 2431 North Rockwell Street, Chicago, Illinois.

OUR electric oil heaters do away with warming up motors. Plug in 15 minutes, open your doors and fly away! Try one, $9.50; ready to attach to OX-5 or attach to oil tank. Air Transport Equipment, Garden City, N. Y.

SPARE parts (new) Wright H, 300 hp. All kinds, including new Strombg. N.AU.6 carburetors. List upon request. S. S. Toler, Jr., Box 942, Rocky Mount, N. C.

RECONDITIONED airplanes. Ask for listing. We overhaul, repair and recondition all types. Factory facilities. Best spray paint and recovering jobs. United Air Service, Janesville, Wisconsin.

RYAN Brougham in good condition, motor recently overhauled. Bargain price. Cleveland Pneumatic Tool Co., Cleveland, Ohio.

EQUIPMENT WANTED

WILL pay cash for late model planes and motors, what have you to offer. Aircraft Brokerage Company, 2145 No. Talbot Avenue, Indianapolis, Ind.

WANTED: Bristol Cherub or 4-cylinder converted Henderson motor. Must be in A-1 condition and priced right. S. Rady, 100 W. Main St., Jefferson City, Mo.

WANTED: Late Cessna cabin fuselage stripped. 568 University Ave., St. Paul, Minnesota.

WANTED: OX-5 motor, condition no object. Price, first letter. Address Box 958, Wichita, Kan.

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Guaranteed New

Very low prices due to overstock. Now is the time to overhaul.

OX-10 Push Rod Supports	$0.16
Valve Guides (Miller)	.25
Intake Push Rod Yokes	.35
Exhaust Push Rod Yokes	.25
Intake Rocker Arms	.35
Valve Stem Washers	.02
Lock Washers	.01½
OX-6 Pin Bearings	.15
O-94 Pin Bearings	.10
OX-7 Pin Bearings	.09
26x4 Wheel Streamlines	.65

This offer is made subject to prior sale.

STUART AERO PRODUCTS, Inc.
Thirteenth and Rutger Sts., St. Louis, Mo.

Curtiss Ox-5 Robin

excellent condition, flown less than fifty hours, never crashed, equipped with complete instrument board including Rate of Climb and Bank and Turn. Owner anxious to sell account having bought another plane. Price $2000.00 net.

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BOEING B1E FLYING BOAT

Wasp motor. Six passenger cabin. One year old, one hundred and twenty total hours. Cruise 115 M.P.H. Top Speed 130 M. P. H.

PERFECT CONDITION

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ESSINGTON, PENNA.

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J5 STINSON FIVE PLACE MONOPLANE

475 hours, 75 since motor overhaul. 180 gallon gas capacity and ten gallon oil tank. New tires and control cables. Ship just recently inspected and relicensed. Price $5,750.

STINSON JUNIOR

Five months old, 130 hours. New J5 Motor just installed, 6 hours. Extra equipment, electric starter, landing lights, flares and leather upholstery. Special job throughout. Cost $12,580. Sacrifice at $7,750.

Both ships equipped with latest type landing gear and Bendix wheels and brakes. Never used commercially or damaged and always kept in hangar. Guaranteed in best condition. Will deliver within thousand miles in U. S. Replacing with Tri Motor transport.

AUBURN AUTOMOBILE CO.
Auburn, Ind.

HELMET AND GOGGLES
Special—$3.75—For Both

Helmet is made of fine quality calfskin leather and lined with high-grade chamois. Goggles have ventilated aluminum frames, sponge rubber padding and wide head-band. A $12.00 value for only $3.75. State head size.

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FOR SALE

Kinner Arrow Sport

Brand new. Only five hours' flying time, including ferrying from factory. $3,750 Cash. Reducing equipment.

SAUNDERS SYSTEM
Fairfax Airport, Kansas City, Kansas

FOR SALE

Damaged Curtiss Challenger Engine Velie M5, Nearly New, less Magnetos, also Whirlwind J5.

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POSITIONS VACANT

ENGINEERS and draftsmen. Leading aircraft manufacturer can use services of practical, experienced engineers and draftsmen. P-357, Aviation, 520 No. Michigan Ave., Chicago, Illinois.

LONG established eastern aircraft manufacturer requires services of tool designer, having thorough understanding of metal working tools, jigs and fixtures. Experience in semi-permanent tools for drawn or formed sheet metal parts desirable. The right personnel should also have some knowledge of tool drafting practice and be able to demonstrate the practicability of the tools in actual operation. Give detailed experience and salary required. Replies confidential. P-417, Aviation, Tenth Ave. at 36th St., New York.

WANTED aeronautical designers, stress men, draftsmen, foreman and shop men; must be experienced. Call in person or write fully. The Verville Aircraft Company, 7424 Melville Ave., Detroit, Michigan.

WANTED: Several first-class aeronautical draftsmen. Experienced men only need apply. Pitcairn Aircraft, Inc., Pitcairn Field, Willow Grove, Pa.

POSITIONS WANTED

AERONAUTICAL engineer with long experience on design and structures available in February. Competent and with several approved type airplanes to credit. PW-418, Aviation, 520 No. Michigan Ave., Chicago, Ill.

OPERATIONS manager, transport pilot, trained during World War, successful record in executive capacity. Familiar with all branches of aviation operations. Desire connection with well financed company, where results govern compensation. Strictly sober. Married. C. F., Hotel St. Regis, No. 519, Cleveland, Ohio.

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PILOT-MECHANIC wants work, 1,700 hours, all types, unlicensed, unmarried. Age 31. Go anywhere, type work and salary no object. Slim, Box 1082, Duncan, Oklahoma.

TRANSPORT pilot with licensed plane wishes position. PW-412, Aviation, Tenth Ave. at 36th St., New York.

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The Major Aircraft Corp. will accept and train for executive and other aircraft positions a limited number of men and young men.

An unusual opportunity is open to those who, after a short training period in our factory, can meet with our requirements. Training fee required; interviews 9 a.m. to 9 p.m. all week or write to

MAJOR AIRCRAFT CORPORATION
129-131 Grand Ave., Cor. Myrtle, Brooklyn, N. Y.

POSITIONS WANTED

TRANSPORT pilot, ex R.A.F.; 5 months' war flying, seeks flying position with corporation or individual. Eastern States. Available February 5th. PW-425, Aviation, Tenth Ave. at 36th St., New York.

TRANSPORT pilot, 3,000 hours, cross country, instruction and sales experience. References furnished. PW-424, Aviation, 520 No. Michigan Ave., Chicago, Ill.

YOUNG man, 24 with 20 solo hrs. and 2 yrs. experience on flying field wants to work for time, and small pay—will go anywhere. PW-409, Aviation, Tenth Ave. at 36th St., New York.

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WANTED, sales promotion men to introduce the Alexander line of gliders and airplanes. Several profitable plans are open to fliers and non-fliers who can sell. In some cases demonstrators and drawing accounts will be furnished. An opportunity is offered to break into the most profitable branch of aeronautics and to prepare yourself to make $10,000 or more per year with little or no initial capital. Send your qualifications to Alexander Aircraft Company, Room 11, Colorado Springs, Colorado.

WANTED

NACA Reports on Airfoils, 93 (I) and 182 (III). State price. W-414, Aviation, Tenth Ave. at 36th St., New York.

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OX 5-cylinders, rebushed nad reseated. Guides $1.50. Seats $2. Most complete repair shop in the South. We carry a complete line of parts and supplies. Prompt service assured. Curtiss-Wright Flying Service, Municipal Airport, Memphis, Tenn.

EMBLEMS designed for planes, schools and aircraft manufacturers. Will paint on planes in Metropolitan area. Reasonable. I. I. Van Dyck, 67 West 44th St., Bayonne, N. J.

If you are really interested in Aviation—will you accept a free membership to the AVIATION SERVICE LEAGUE? We want 100,000 members to promote aviation. If you are over 18 years of age send for free membership. Positively no obligation.

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Reduced rates in our plane repair and paint shop. You know our quality work.

Write for estimates.

FLYERS INC.,
R. F. D. Watervliet, N. Y.

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Write it as the first word of your ad.

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This will assure proper classification in the column. The right is reserved to reject, revise or properly classify all Want Advertisements.

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Lincoln's Birthday — February 12th—will advance the closing of the Feb. 15th Issue one day. We ask advertisers to cooperate with us by sending new advertisements or change of copy early

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10 A.M. Saturday, Feb. 8, 1930

Avia.

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1929 — a year of bewildering progress! Nearly 200% increase in licensed flyers. Domestic air mail doubled. Scheduled operations increased from 27,000 to 100,000 miles daily. 166 approved type certificates for aircraft, 19 for engines, 28 for propellers. 90,000,000 people in territory served by air lines for freight, mail, and passengers. And 1930 promises to break all records again. Are you accurately posted on all the important developments in the field? You can have all the facts at your finger tips in

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Over 200 photographs, as well as airway maps of the United States, South America, and Europe. And to make the volume absolutely complete — a day-by-day chronology of aeronautical events in 1929! Durably bound to withstand constant handling. Price $6.00. Send for your copy promptly!

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AIRCRAFT MAGNETOS

contributed their part in the successful safety test flight of the Curtiss TANAGER, powered with a Curtiss "CHALLENGER" radial engine.

The majority of modern American Aeronautical Engines are equipped with SCINTILLA AIRCRAFT MAGNETOS.

They are selected because of their:

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Scintilla Aircraft Magnetos are obtainable for engines of from one to eighteen cylinders.

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GOOD ENOUGH TO BE USED REGARDLESS OF EXPENSE -

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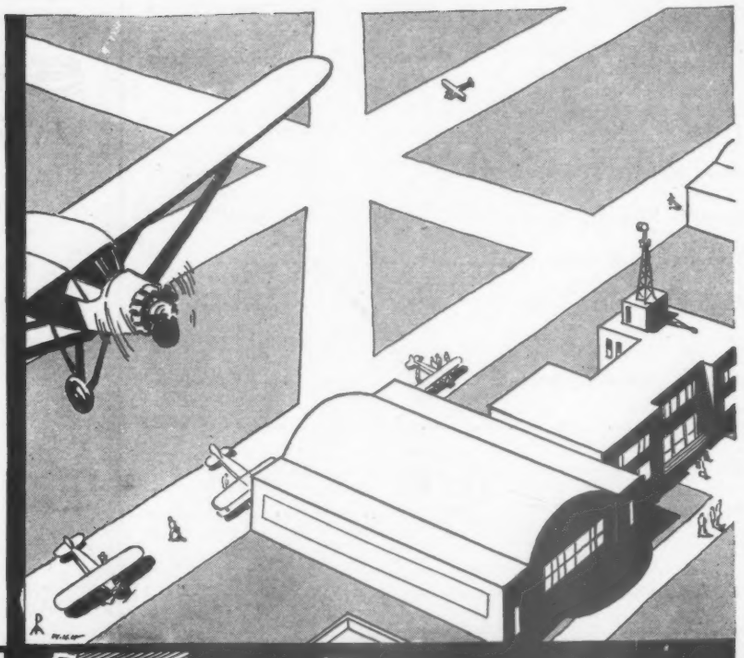

If you were out to build the best airport, regardless of expense, you'd likely select Natco Structural Clay Tile; for Natco gives the qualities that are essential.

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STRUCTURAL CLAY TILE

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A group of student pilots watching the new tri-motored all-metal Ford training ship as it is flying low over Parks Airport.

Now *MORE THAN EVER BEFORE* YOU NEED PARKS TRAINING

THE day of the half-baked, poorly trained pilot in commercial aviation is GONE FOREVER. It will never return. Today aviation wants only the properly trained flyer—the man to whom passengers, mail and precious cargoes of freight and express can be entrusted safely.

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251 Missouri Theatre Building
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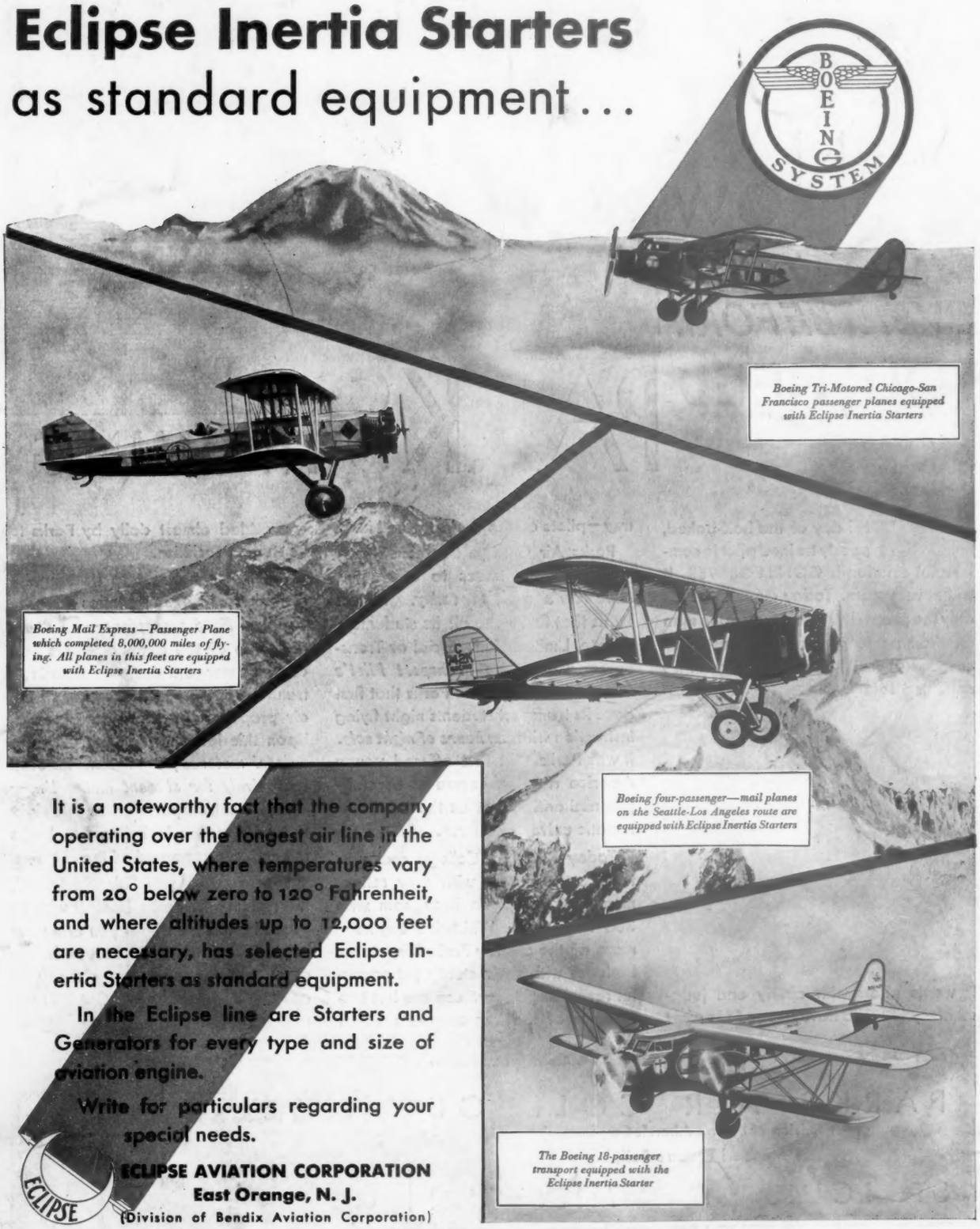

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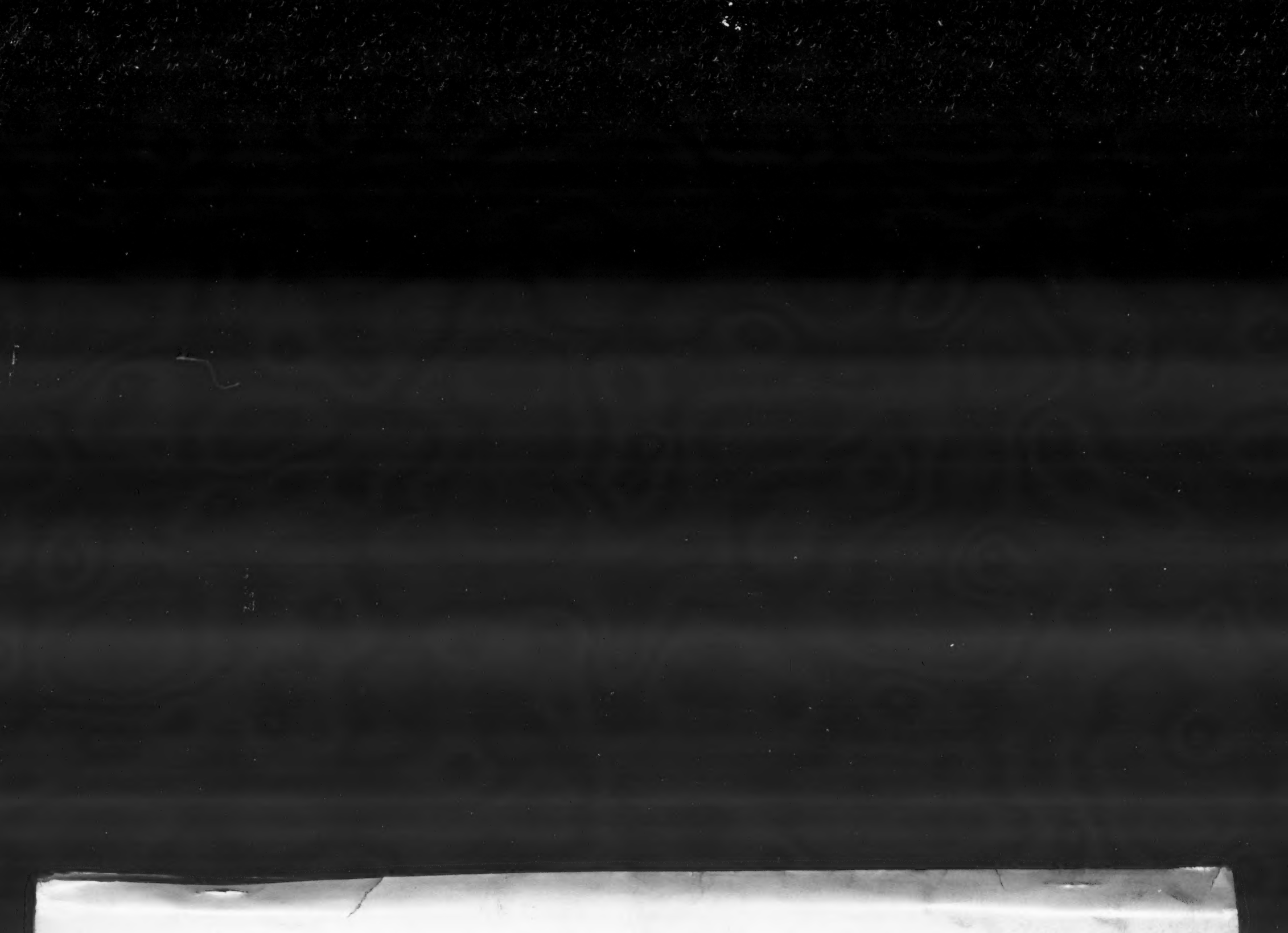
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